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ABSTRACT

The Minnesota Area Health Education Center programs (AHEC) from 1972-81 improved health care in rural Minnesota areas by providing 2,200 health-professional students and resident physicians with off-campus courses and clinical training. Other programs provided continuing education, patient education, quality assurance, and minority career recruitment. More than 3,000 participated in AHEC programs. A follow-up of 1,500 former participants and a survey of 400 AHEC-involved medical students and residents showed the following project impacts: (1) improved distribution of health professionals (to rural areas); (2) more primary care health professionals; (3) high-quality decentralized health-professional education; and (4) AHEC preceptorships during third and fourth years of medical school being more influential than other AHEC-supported clinical training experiences in choice of specialty and desired practice location. Recommendations include flexible federal AHEC regulations that do not mandate decentralized training in community hospitals; a stable source of federal support for living expenses of students wishing to explore rural health-care practices; emphasis on off-campus AHEC preceptorships during third and fourth year medical school; provisions in future national and state AHEC evaluations for follow-up of former AHEC participants; control group designs; and greater dissemination and use of evaluation results. (Author/KC)

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Evaluative Follow-up of Former Medical Students, Resident Physicians, and Other Health Professional Students Participating in 1972-80 Minnesota Area Health Education Center Programs

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University of Minnesota

Area Health Education Center

A Report Pursuant to the Previously Submitted
Plans for Evaluation of the 08 and 09 years
of the Minnesota AHEC Project
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ABSTRACT

Evaluative Follow-up of Former Medical Students, Resident Physicians, and Other Health Professional Students Participating in 1972-80 Minnesota Area Health Education Center Programs

The Project from 1972-81 improved health care in rural and underserved Minnesota areas by providing 2,200 health-professional students (over 10 fields) and resident physicians with off campus courses and clinical training. Other programs provided continuing education, patient education, quality assurance, and minority career-recruitment. Over 3,000 thus participated in AHEC programs. The University of Minnesota (U of M) AHEC Office conducted needs assessment, program planning-administration, and evaluation.

The present evaluative research included follow-up of 1,500 former participants in 30 of the 40 AHEC programs, and during the period 1972-80. Also included was a survey of 400 AHEC-involved medical students and residents.

Project impacts included:

- *Improved distribution of health professionals.* Follow-up indicated 40% of former participants completing all training are practicing in outstate Minnesota. Medical students and residents hope to practice in rural areas and rate AHEC rotations as important to this decision.
- *More primary care health professionals.* For example, AHEC-involved medical students and residents rated AHEC rotations influential in decisions (made by 80%) to practice primary care.
- *High-quality, decentralized health-professional education.* Over 2,400 different training experiences were provided for health professional students and resident physicians. About half of

these experiences took place in rural, non-metropolitan areas. Surveyed medical students and residents rated 90% of AHEC rotations as excellent-good in problem range and skill development.

Additional analyses suggest the following: AHEC preceptorships during Phase D (third and fourth years) of medical school are more influential than other AHEC-supported clinical training experiences in choice of specialty and desired practice location. AHEC preceptorships and rotations are influential in career decisions even for that minority of AHEC-involved medical students and residents deciding against primary care in rural areas. Even when AHEC participants' hometown type and other background variables are held constant, AHEC preceptorships rated as providing good experience with clinical problems and rated as important to practice location intentions--such preceptorships are related to desire to practice in a rural area.

Recommendations include: flexible federal AHEC regulations that don't mandate decentralized training in community hospitals; a stable source of federal support for off-campus living expenses of health professional students wishing to explore rural-area health-care practice; emphasis on off-campus AHEC preceptorships during the formative Phase D period of medical school; provisions in future national and state AHEC evaluations for follow-up of former AHEC participants, control group designs, and greater dissemination and use of the evaluation results.

CONTENTS

Page

Abstract III

Tables VIII

Figures XI

Executive Summary XII

  Overview and Research Methods XII

  Research Questions and Answers XIII

  Discussion and Additional Research Results XVIII

  Recommendations XXI

INTRODUCTION 1

  Legislation and Background 2

  Previous Evaluative Research Concerning the Minnesota AHEC Project 3

  Overview of the Present Evaluative Follow-up Study 8

METHOD 11

 What Is the Minnesota AHEC Project? 11

  Programs Funded as Part of the Minnesota AHEC Project 11

 The Follow-up Sample: Who Were the AHEC Participants Studied in this Research? 18

  The Follow-up Sample, 1972-80, vs. the Total Group of AHEC Participants, 1972-81 19

  The Classification of Follow-up Groups of Former AHEC Participants 19

  Data Collection 27

  Selected Demographic Characteristics of the Studied Former AHEC Participants 28

Page

Survey of AHEC-Involved Medical Students and Resident Physicians........................ 29

A "Control" or Comparison Group of Non-AHEC Medical Students............................ 30

Classification of Communities by Type and Size.................................... 30

RESULTS.. 31

1. What Was the Minnesota AHEC Project's Contribution to Improved Geographic Distribution of Health Professionals?.. 32

Current Professional Locations of Former Participants in Minnesota AHEC Programs......... 32

The Intended Future Practice Locations of Former AHEC-Involved Medical Students and Resident Physicians.............................. 50

Impact of the Minnesota AHEC Project on the Practice Location Intentions of Former AHEC-Involved Medical Students and Resident Physicians...... 52

2. What Was the Minnesota AHEC Project's Contribution to Improved Supplies of Primary Care Physicians?.......... 59

Current Specialty Choice of Former AHEC-Involved Medical Students and Resident Physicians...... 59

Comparing Current Specialty Choice of AHEC-Involved vs. Non-AHEC U of M Medical School Graduates.................................. 60

The Importance of an AHEC-Sponsored Preceptorship or Rotation in Current Choice of a Specialty................................ 64

Future Practice of Primary Care in Rural and Underserved Areas: AHEC Participants' Conception of an Ideal Medical Practice Situation for Themselves in 5-10 Years................ 66

Impact of the Minnesota AHEC Project on the Supplies of Primary Care Health Professionals.......... 72

Page

3. What Was the Minnesota AHEC Project's Contribution to Decentralization of Health Professional Training in Minnesota? 75

   Decentralization of Training Through Off-Campus Preceptorships, Clinical Rotations, and Courses 76

4. What Was the Quality of Health Professional Training in Programs Funded Under the Minnesota AHEC Project? 80

   Experience With a Range of Clinical Problems 80

   Development of Professional Skills 82

   Written Comments Concerning the Quality of AHEC-Supported Preceptorships and Rotations 82

DISCUSSION 85

   Summary of Project Impact on the Professional Plans of AHEC-Involved Medical Students and Resident Physicians 85

   The Validity of Project Impact Assessments Based on Self-Reported Survey Data 88

   Recommendations for Improving the National AHEC Effort and for Improving Programs Similar to Those Supported by the Minnesota AHEC Project 96

REFERENCES 100

APPENDIX A 103

Cover Letter and Questionnaire Used in Survey

TABLES

Number		Page
1	Minnesota AHEC Training Programs Included in the Follow-up Research............................	13
2	Participation in AHEC Programs: The Follow-up Sample................................	17
3	Participation in Various AHEC Training Programs by Different Follow-up Groups of AHEC Participants..........................	21
4	Number of Different AHEC Programs Taken by Participants.....................................	26
5	Current Professional Location of Follow-up Groups of Former Participants in AHEC Programs: Percentages.............................	39
6	The Relationship in Minnesota Among Primary Medical Care Shortage Areas, Locations of AHEC Training, and Current Professional Locations of Former AHEC Participants...............	42-43
7	Current Professional Location of Former AHEC-Program Participants: Type of Community.............	45
8	Current Professional Location of Former AHEC-Involved Medical Students and Residents Known to Have Completed Residency Training: Type of Community.......................................	46
9	Current Professional Location of Former AHEC-Program Participants: Size of Community.............	48
10	Current Professional Location of Former AHEC-Involved Medical Students and Residents Known to Have Completed Residency Training: Size of Community.......................................	49
11	Ideal Type of Practice Location in 5-10 Years as Reported by Former Medical Students and Resident Physicians Participating in AHEC Programs..	51
12	Ideal Size of Practice Location in 5-10 Years as Reported by Former Medical Students and Resident Physicians Participating in AHEC Programs....................................	53

TABLES (continued)

Number		Page
13	Ideal Geographic Area for Practice Location in 5-10 Years as Reported by Former Medical Students and Resident Physicians Participating in AHEC Programs	54
14	Importance of AHEC-Sponsored Rotation in Choice of Practice Location: Ratings of Former Medical Students and Resident Physicians	55
15	Ideal Type of Practice Location in 5-10 Years for Former Medical Students and Residents from Different Types of Hometown	57
16	Current Specialty Choice of Former Medical Students and Resident Physicians Participating in AHEC Programs	61
17	Current Specialty Choice of AHEC and non-AHEC U of M Medical School Graduates, Classes of 1976-79	63
18	Importance of AHEC-Sponsored Rotation in Choice of a Specialty: Ratings of Former Medical Students and Resident Physicians	65
19	Time Spent in Various Activities in an Ideal Practice Situation in 5-10 Years: Estimates of Former AHEC-Involved Medical Students and Residents	68
20	Ideal Type of Practice Arrangement in 5-10 Years; as Specified by Former AHEC-Involved Medical Students and Residents	69
21	Important Features of an Ideal Practice Situation as Reported by Former Medical Students and Resident Physicians Participating in AHEC Programs	71
22	The Importance of Work With Medically Underserved Patients as a Feature of an Ideal Practice Situation	73
23	Locations at Which Follow-up Groups Received AHEC-Sponsored Training	77

TABLES (continued)

Number | | Page

24 Locations at Which Follow-up Groups Received AHEC-Sponsored Training: Type of Community.......... 78

25 Experience With a Range of Clinical Problems During AHEC-Sponsored Rotations: Ratings of Former Medical Students and Resident Physicians... 81

26 Development of Professional Skills During AHEC-Sponsored Rotations: Ratings of Former Medical Students and Resident Physicians............. 83

27 Self-Reported Influence of AHEC Training Experience on Practice Location Intentions, for Medical Students and Residents Preferring Different Types of Practice Location................. 93

28 Self-Reported Influence of AHEC Training Experience on Specialty Choice, for Medical Students and Residents Selecting Different Types of Specialty................................. 94

FIGURES

Number		Page
1	Locations at which follow-up groups received AHEC-sponsored training.....................	7
2	Current professional location of follow-up groups of former participants in AHEC programs.......	33
3	Current professional location of 108 former medical students and residents participating in AHEC programs who also are known to have completed residency training as of 1980.............	35
4	Current professional location of the 72 former dental students participating in AHEC programs.......	36
5	Current professional location of the 347 former nursing students participating in AHEC programs......	37

EXECUTIVE SUMMARY

Evaluative Follow-up of Former Medical Students, Resident Physicians, and Other Health Professional Students Participating in 1972-80 Minnesota Area Health Education Center Programs

The Minnesota Area Health Education Center (AHEC) Project from 1972-81 has improved health care in rural and outstate (and, to some extent, urban) Minnesota, largely by providing about 2,200 different health professional students and resident physicians with training opportunities designed to encourage their later practice in rural and outstate (or inner-city) areas. These AHEC participants--representing over 10 fields including medicine, dentistry, nursing, dental hygiene, pharmacy, dietetics, physical therapy, occupational therapy, social work, and clinical psychology--also represented a total enrollment of over 2,400 in AHEC-supported preceptorships, clinical rotations, and courses. In addition, the AHEC Project has brought continuing education seminars and presentations to rural and outstate areas for over 1,000 practicing health professionals. All of these activities were accomplished with the aid of $5.8 million in federal AHEC funds. State funds for such activities continue to be very limited.

Overview and Research Methods

The present research study is a follow-up of a sample of about 1,500 former health professional students and resident physicians participating in 30 of the 1972-80 Minnesota AHEC Programs. This sample represented only half of the total group of about 3,000 participating in all 40 AHEC programs during the entire life of the project, 1972-81. Also followed up were a comparison or "control" group of 200 former University of Minnesota (U of M) Medical School graduates, constituting a stratified random sample of those 1976-79 graduates who did not participate in AHEC programs.

A variety of archival data sources were used to seek the current professional location of all 1,500 studied former participants in the 30 studied AHEC programs, and the 200 members of the comparison group.

In addition, the nearly 500 former AHEC-involved medical students and residents were surveyed using mailed questionnaires. Nearly 400, or about 80% of this group, returned their questionnaire at least partly completed, and are called respondents.

Hence, while evidence on the geographic distribution of current professional locations was available for all groups of former AHEC participants, evidence on the quality and influence of AHEC-supported educational experiences, and on current professional activities and future plans, was available only for former AHEC-involved medical students and residents. For these latter groups were the only ones surveyed.

This report therefore focuses heavily on research results obtained from archival and survey follow-up of these AHEC-involved medical students and residents.

Research Questions and Answers

The present evaluative follow-up provides answers to the following questions:

1. What was the Project's contribution to improved geographic distribution of health professionals?

About 40% of those 1,120 former participants in Minnesota AHEC programs who have finished all their training are currently (as of the follow-up in 1980) practicing in outstate areas of Minnesota (outside the Minneapolis-St. Paul Twin Cities area), about 40% are practicing in the seven-county Twin-Cities area, about 10% are practicing outside Minnesota, and about 10% have addresses unknown to Project staff.

As of mid-1980 only 22% of the approximately 500 AHEC-involved medical students and residents had completed their residency training. Among these residency completers, three-fourths are practicing in Minnesota; and one-third, in rural areas, outside a Standard Metropolitan Statistical Area.

Among 347 former AHEC-involved nursing students, about half are located professionally in rural areas. Among 72 former dental students, one-fourth are currently in rural communities.

About 5% of the 1,120 AHEC participants who have completed their training are currently located in a Minnesota county designated wholly or in part as a federal Primary Medical Care Shortage Area.

If one defines smaller communities as those under 25,000 population, then about one-third of currently practicing, former AHEC participants are now in smaller communities. This proportion is higher for AHEC-involved registered nurses and dental hygienists.

Intended future practice locations of AHEC-involved medical students and residents clearly favored rural areas. Nearly two-thirds of these respondents indicated they would choose ideally to practice in a rural area in 5-10 years, after they had completed all training and any medical service obligations.

Even though most of the respondents were still in training, the survey indicated that AHEC participation had influenced many toward a decision to practice eventually in a rural area. Nearly three-fourths of the rotations and preceptorships taken by these former medical students and residents were rated as either "very" or "somewhat" important to their choice of an ideal practice location.

A majority of even those respondents who had grown up in an urban area still preferred a rural community as their ideal practice location.

2. What was the Project's contribution to improved supplies of primary care physicians?

Among the entire group of former AHEC-involved medical students and residents, 81% have chosen a primary care specialty. Specifically, 58% have chosen family practice; 17%, internal medicine; 5%, pediatrics; and 1%, obstetrics and gynecology.

AHEC-supported training experiences were apparently influential to many of these decisions toward primary care. About 60% of respondents rated the AHEC experience as very or somewhat important to their specialty decision.

Additional survey items allowed respondents to describe features of an ideal practice situation for themselves in 5-10 years. The concept these respondents hold of an ideal practice situation for themselves accords well with the AHEC Project goals of high-quality primary care in rural and outstate areas. For most respondents, the ideal practice situation included such features as a high proportion of time spent in direct patient care; a group practice or partnership; availability of good hospitals, consulting physicians, and other clinical support; shared call with other area physicians; and opportunities for continuing education.

Presumably, if these former AHEC participants are offered opportunities to practice in rural or outstate areas where many of these practice features are present, then these young physicians and physicians-in-training will soon practice primary care in these areas. As noted previously, some already are. Again, of the 108 former participants who had completed their residency training as of mid-1980, one-third were practicing in rural communities.

Financial incentives such as income potential or availability of loans were not rated important in choice of an ideal practice situation nearly as often as many professional climate and lifestyle features. Overall, financial incentives were very or somewhat important for somewhat over half of the respondents.

Opportunities to work with underserved patients lacking access to adequate health care were rated as very or somewhat important to choice of an ideal practice situation by 42% of respondents. The opportunity to work at least part-time in a health maintenance organization was rated very or somewhat important to this decision by only 8%. Because of the wording of the items, these results do not indicate opposition to HMOs or to work with the underserved. They do, however, indicate these two features are less salient than many others to choice of an ideal practice situation.

3. What was the Project's contribution to decentralization of health professional training in Minnesota?

The Minnesota AHEC Project has made substantial contributions to the decentralization of health professional training (a) by providing outstate preceptorships, clinical rotations, and courses for health professional students; (b) by developing and sending independent-study materials to outstate locations; (c) by making Minneapolis-based library-extension reference services available to students training outstate;

(d) by bringing continuing education to health professionals practicing outstate; and (e) by encouraging and planning improved U of M Health Sciences outreach activities.

As noted previously, when the Minnesota AHEC Project ends in October, 1981, it will have provided or supported since 1972 a total of about 2,400 different health professional training experiences for about 2,200 different students and resident physicians, in about 10 different professional fields. About half of these AHEC-supported training experiences took place in rural, non-metropolitan areas. Continuing education programs have also been brought to over 1,000 health professionals practicing in rural and outstate areas.

4. What was the quality of health professional training offered in programs funded under the Minnesota AHEC Project?

Efforts were made to insure that each program included in the Minnesota AHEC Project provided high quality training and educational experiences. Funding was contingent on each program's preparing written training and instructional objectives, along with detailed written plans for staffing and implementing the programs. The development of each program was closely monitored, and charted via quarterly written progress reports.

Evidence available from the survey of former AHEC-involved medical students and residents suggests that AHEC-supported training experiences were generally of excellent quality. Over 90% of all 445 preceptorships and rotations rated (virtually all those taken by respondents) were regarded as "excellent" or "good" in giving experience with a range of clinical problems. Also, nearly 90% of these preceptorships and rotations were rated either excellent or good in helping develop professional skills.

The great majority of these clinical training experiences were in primary care, especially family practice and general internal medicine.

Discussion and Additional Research Results

Results just presented from the survey of former AHEC-involved medical students and residents suggest that participation in AHEC-sponsored preceptorships or rotations (usually in outstate areas) has made a measurable contribution to the career decisions of these young professionals concerning practice location and specialty choice.

Clearly, the specialty choice and practice location goals of these former AHEC participants are entirely consistent with the AHEC Project goals of improved supply and distribution of primary care health professionals. Furthermore, AHEC-program experiences have apparently influenced the decisions of these former medical students and residents toward rural primary care.

As revealed in the AHEC survey, the concept these respondents hold of an ideal practice situation for themselves in 5 to 10 years also accords with the AHEC Project goals of high quality primary care in rural and outstate areas.

AHEC-involved U of M Medical School graduates were much more likely than a control group of non-AHEC peers to have chosen family practice as a specialty; more likely to have obtained a government loan or loan forgiveness agreement with incentives for later practice in a rural or underserved area; and somewhat more likely to have taken their residency training in Minnesota (a good index of later practice intentions). In short, AHEC Medical School graduates seem more inclined toward primary care in rural or underserved areas of Minnesota than their non-AHEC peers.

It would, of course, be improper for the AHEC Project to claim sole credit for the preceding research outcomes indicating differences between AHEC and non-AHEC graduates.

In the absence of a true control-group design--with, for example, random assignment of medical students to AHEC-supported rural, primary-care preceptorships vs. some other non-AHEC clinical training (e.g., hospital-based urban rotations)--it is difficult to assess the degree to which many research outcomes and follow-up observations have been influenced by AHEC-program participation.

Since medical students and residents volunteered to take elective AHEC-supported, rural primary-care preceptorships and rotations--both AHEC participation and later career choices favoring rural primary-care could have been produced by a pre-AHEC inclination toward rural primary care.

Several analyses conducted as part of this research do support, however, the validity of self-reported survey ratings suggesting that AHEC participation was influential in subsequent career choices of medical students and residents.

The first analysis found that AHEC-supported preceptorships and rotations occurring during the (Phase D) third and fourth years of Medical School (e.g., the 9-12 month Rural Physician Associate Program (RPAP) preceptorships and the 6-week Phase D Preceptorships) were rated more important in influence on specialty choice and practice location choice than AHEC-supported preceptorships and rotations occurring either earlier in medical education (e.g., Phase B Preceptorships) or later (e.g., residency rotations). This fact supports the hypothesized importance of Phase D as a crucial formative period during medical education, when students are able to apply their newly developed understanding of medical practice dimensions to their own career planning. Also, since the importance ratings of AHEC preceptorships varied as expected by the notion of Phase D as a key period, the validity of these importance ratings is supported.

In short, if importance ratings for AHEC-supported rural-area primary care preceptorships are merely reflections of already determined career choices, then we would not expect dramatic differences between ratings of Phase D preceptorships (particularly, the RPAP preceptorships) and other AHEC-supported preceptorships and rotations.

Also, if importance ratings of these preceptorships were merely restatements of a preexisting interest in rural primary care, then these ratings should be highest for those who have chosen a primary care specialty and intend to practice in a rural area.

A second type of analysis showed, however, that AHEC preceptorships and rotations were important to choices of specialty and practice location even for a clear majority of those who had chosen non-primary-care specialties and non-rural intended ideal practice locations. Accordingly, AHEC preceptorships and rotations were seen as influential even among AHEC participants who chose specialties or practice locations different from those of their AHEC experience.

A third type of analysis used partial correlation methods to determine for Phase D and RPAP AHEC groups the relation between ratings of AHEC preceptorships and type of intended future practice location, while statistically controlling or holding constant the influence of three pre-AHEC-program background variables: type of hometown, participation in a loan program with forgiveness for underserved-area practice, and degree of primary-care emphasis in medical school specialty track.

Even with these three important pre-AHEC-program background variables controlled, there were small but statistically significant partial correlations suggesting that an AHEC preceptorship or rotation that provides experience with a range of clinical problems and that is rated as important to practice location intentions--such a preceptorship or rotation is also related to a decision ideally to practice in a rural area. Again, the validity of rated AHEC-program influence is supported.

Recommendations

The following recommendations, based on issues identified in the report, should be considered in seeking ways to improve the national AHEC effort, and to plan and improve programs similar to those supported by the Minnesota AHEC Project:

1. Federal regulations for programs designed to improve the supply and distribution of health professionals should require decentralized training, but should not mandate a particular form of decentralization (e.g., regional AHECs based in community hospitals).

2. A stable federal source of funding should be established for off-campus support of health professional students who wish to take part of their clinical training in a rural (or urban) underserved area.

With no alternative sources of funding for extraordinary student living expenses connected with off-campus training, students may be reluctant to explore health care practice in rural or outstate areas. The students most affected by such cutbacks may be those uncommitted to, but curious about, rural or outstate life. These are excellent target students for AHEC programs.

3. A high funding priority should be given to rural, primary-care clinical experiences during the last two years of medical school (Phase D).

AHEC preceptorships and rotations during the formative Phase D period seem for many to be key formative influences on choice of specialty and practice location.

4. Evaluation research concerning local, statewide, or national AHEC programs should be designed, in part, so as to provide information that will be relevant to improving the efficiency of such programs, and their effectiveness in meeting important AHEC objectives. Such evaluation designs should include explicit plans (a) for disseminating (publicly discussing or publishing) evaluation results; and (b) for using these results to improve AHEC programs. Specifically, future evaluations should emphasize follow-up of former AHEC participants, with provision for follow-up of an appropriate non-AHEC comparison or control group.

Recent national evaluations of the AHEC effort have included few or no suggestions for improvement of AHEC programs. One reason for this absence may be that data vital to such suggestions or even to impact assessments--namely, data based on follow-up surveys like that conducted in Minnesota--were not collected during national evaluations.

Evaluative Follow-up of Former Medical Students, Resident Physicians, and Other Health Professional Students Participating in 1972-80 Minnesota Area Health Education Center Programs

High quality training and educational experiences for medical students, resident physicians, and other health professional students; improved supply and distribution of health professionals in rural (and, to a lesser extent, inner-city) underserved areas; and decentralization of health professional training--these are the major goals of the Minnesota Area Health Education Center (AHEC) Project, and of the national AHEC effort.

From 1972 until its end in October, 1981, the Minnesota AHEC Project attempted to improve Minnesota health care, largely by providing about 2,200 different health professional students and resident physicians with training opportunities designed to encourage their later practice in rural and outstate (or inner-city) areas. These AHEC participants--representing over 10 fields including medicine, dentistry, nursing, dental hygiene, pharmacy, dietetics, physical therapy, occupational therapy, social work, and clinical psychology--also represented a total enrollment of over 2,400 in AHEC-supported preceptorships, clinical rotations, and courses. In addition, the AHEC Project has brought continuing education seminars and presentations to rural and outstate areas for over 1,000 practicing health professionals. A total of 40 different programs were offered as part of the Minnesota AHEC Project. All of these program activities were accomplished with the aid of $5.8 million in federal AHEC funds. State funds for such activities continue to be very limited.

This report presents research findings from a follow-up of about 1,500 former health professional students and resident physicians participating in 30 of the 1972-80 Minnesota AHEC Programs. Again, this sample represented only half of the total group of about 3,000 participating in all 40 AHEC programs during the entire life of the project, 1972-81. Also followed up were a comparison or "control" group of 200 former University of Minnesota (U of M) Medical School graduates constituting a stratified random sample of those 1976-79 graduates who did not participate in AHEC programs.

Legislation and Background

The U of M was one of 11 university health professional training centers receiving the first AHEC project 5-year contracts authorized under Section 774(a) of the Comprehensive Health Manpower Training Act of 1971 (P.L.92-157, November 18, 1971). The review and reconsideration of P.L.92-157 in 1975 resulted in new AHEC legislation on October 12, 1976; namely, the Health Professions Educational Assistance Act (P.L.94-484), Section 781, Area Health Education Centers. Section 781 of the 1976 law contained a number of specific requirements for AHEC projects--requirements that had not been included in the original 1971 legislation.

Influential in the design of this 1971 and 1976 AHEC legislation was a report by the Carnegie Commission on Higher Education, Higher Education and the Nation's Health: Policies for Medical and Dental Education (1970). This report made a variety of recommendations for improving health professional education in medicine, dentistry, allied health, and other fields. One of the report's key assumptions was that the supply and distribution of health professionals in rural and central-city areas away from university health sciences centers could be improved by decentralization of health professional education; that is, by providing a greater number of different training sites for young health professionals, and in a greater variety of locations--particularly in underserved locations.

AHEC Objectives

Again, the three major objectives of the Minnesota AHEC Project and the national AHEC effort have been (a) high quality training for health professionals; (b) improved supply and geographic distribution of health professionals, particularly those in primary care; and (c) decentralization of health professional training. This statement of objectives generally paraphrases the goals section of the most recent federal legislation enabling Area Health Education Centers (AHECs); namely; Section 781 of P.L.94-484. Section 781 does not explicitly refer to high quality training, but that objective is certainly implicit in the law's desire to improve the "quality...and efficiency of health personnel in the health services delivery system."

Previous Evaluative Research Concerning the Minnesota AHEC Project

These three objectives, and similar earlier objectives from the original AHEC enabling legislation (Section 774(a) of the Comprehensive Health Manpower Training Act of 1971 (P.L.92-157), have provided the basic structure for at least a half dozen efforts to evaluate the Minnesota AHEC Project. Some of these efforts have included the Minnesota Project as part of evaluations that were national in scope. Other evaluations were focused solely on Minnesota, and supported with Minnesota Project funds.

A "summative evaluation" of the Minnesota AHEC Project's activities from 1972 through 1976 was conducted by Project staff (Feldman, Spannaus, Ward, & Welch, 1977). For each of about 40 different programs and activities supported by the Minnesota AHEC Project during this period, the summative evaluation report provided descriptive and evaluative information. Evaluative data were gathered for each program using interviews--and, in some cases, rating scales--from program staff, participants, and/or "key informants" knowledgeable about the program.

The evaluation was "summative" in the sense that it attempted to assess the total quality and impact of all Minnesota AHEC programs during a specified time period. The evaluation was not directly designed to be a tool of program management, concurrent with the operation of a program. Some programs had in fact been terminated before they were evaluated by Feldman et al. Hence, the Feldman et al. evaluation was not a "formative" evaluation, although certainly much of the analysis in the summative evaluation report provided compelling suggestions for the improvement of AHEC programs that would survive the mid-1970's.

The Feldman et al. evaluation most directly addressed the AHEC objective of high quality training. Attainment of the objective of improved geographic distribution could not be directly addressed (i.e., by tracking the geographic distribution of former AHEC particpants), simply because not enough time had elapsed to allow former participants to complete training and choose professional locations. Indirect evidence, from participant self-reports and from key informants, was used to suggest that AHEC programs had influenced participants toward intentions to practice in rural and underserved areas.

The Minnesota AHEC Project was included as part of two additional evaluations that were national in scope. The first evaluation, by Odegaard (1979), primarily addressed the AHEC objectives of decentralization and regionalization of health professional training. The second, conducted by the U.S. Public Health Service (1979), and largely using data analyses conducted by the Contract Research Corporation, primarily addressed the AHEC objective of improved geographic distribution and supply of health professionals.

Both of these national evaluations adopted curiously narrow definitions of major AHEC objectives. When measured against these narrow definitions, the success of many AHEC projects, including Minnesota's, could not be established as extraordinary.

Odegaard conducted on-site visits, and interviewed key informants, to prepare an evaluative history of the 11 original AHEC projects that began in 1972. Although hired by the 11 original AHEC projects, Odegaard represented the Carnegie Council on Policy Studies in Higher Education. This Council is the successor of the Carnegie Commission on Higher Education, which in 1970 coined the term "area health education centers" in Higher Education and the Nation's Health. This Carnegie report, which influenced legislation and accompanying regulations for AHECs, advocated a particular form of AHECs and decentralized health professional education. Namely, the Carnegie report suggested that AHECs be centered in regional hospitals, in communities remote from a state's main health sciences training center(s).

Odegaard obviously and understandably adopted the narrow Carnegie concept of decentralized health professional education--that is, regionalized, remote-site AHECs based in community hospitals. Not surprisingly, Odegaard was critical of the Minnesota AHEC Project: "The impact of the AHEC Program in Minnesota has certainly been less than that of the programs previously described" (p. 58). Behind this global criticism, however, is only the single fact that Minnesota has not developed regional AHECs. Nor was the Minnesota Project (or the 10 other original AHEC projects) required to develop regional AHECs; the original AHEC projects were exempted from this 1976 requirement for new AHEC projects.

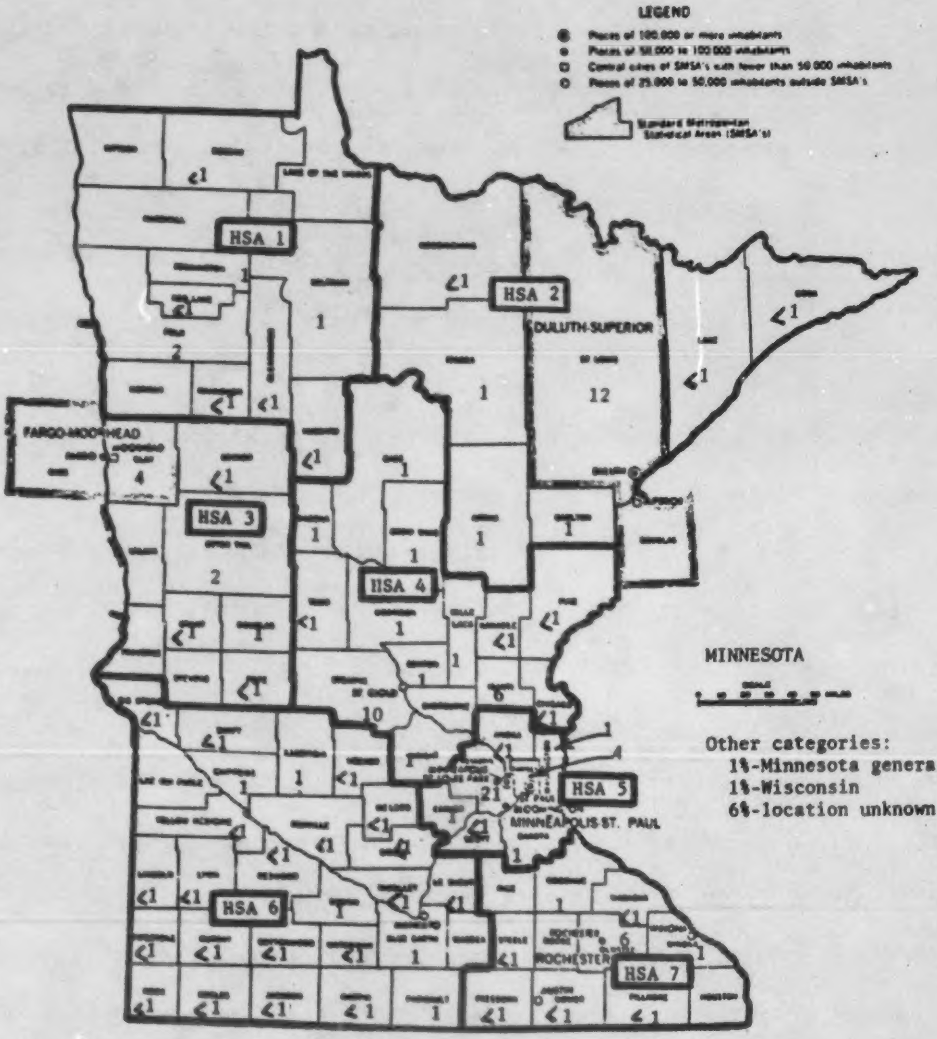
Never addressed by Odegaard is the success of Minnesota (and other AHEC-project states) in meeting the other two objectives of improved supply and distribution of health professionals, and high quality training.

The Minnesota AHEC Project did in fact, foster a high degree of decentralization of health professional education, although not of the Carnegie variety. This decentralization largely took the form of preceptorships, clinical rotations, and courses--offered at a large variety of rural and outstate locations (see Figure 1).

The U.S. Public Health Service evaluation, published and transmitted to Congress as An Assessment of the National Area Health Education Center Program (1979), adopted a very narrow definition of the AHEC objective of improved supply and geographic distribution of health professionals. This evaluation compared, for periods before and after the implementation of the national AHEC program, the total supplies of certain types of health professionals in AHEC-project target areas with the total supplies in a comparison group of generally similar non-AHEC counties.

The assumption of this evaluation design--that AHEC programs would "turn around," or substantially improve, the total supply of health professionals in areas where AHEC training was offered--seems unreasonable. A given social program should be expected to have social impact proportional to the resources and the people involved in that program.

The Minnesota AHEC Project, while substantially funded, still represented only a small portion of health professional training in Minnesota. Nevertheless, this project provided significant rural and outstate


LEGEND
Places of 100,000 or more inhabitants
Places of 50,000 to 100,000 inhabitants
Central cities of SMSA's with fewer than 50,000 inhabitants
Places of 25,000 to 50,000 inhabitants outside SMSA's
Standard Metropolitan Statistical Areas (SMSA's)
HSA 1
HSA 2
HSA 3
HSA 4
HSA 5
HSA 6
HSA 7
DULUTH-SUPERIOR
FARGO-MOORHEAD
MINNEAPOLIS-ST. PAUL
ROCHESTER
MINNESOTA

Other categories:
1%-Minnesota general
1%-Wisconsin
6%-location unknown

Figure 1. Locations at which follow-up groups received AHEC-sponsored training. Number entries are percentages of 1,580, a sample of all AHEC training experiences.* HSAs are Health Service Areas (only Minnesota portions of interstate HSAs are shown.) (Map adapted from U.S. Bureau of the Census, 1972, p. 25-501.)
*These 1,580 experiences represent only 30 of 40 AHEC programs; namely, programs for students or resident physicians that were judged to have potential influence on future practice locations. Also, these experiences were only those documented through 1979 or mid-1980, depending on the program (see p. 8 and later sections of report).

training experiences for many of Minnesota's future and current health professionals. During the 1980's about 9% of Minnesota's 8,000 active non-federal physicians, about 5% of Minnesota's 2,700 dentists, and about 1½% of Minnesota's 36,000 licensed registered nurses will be former participants in an AHEC-supported training program. (Total Minnesota supply estimates for these professions are consistent with data reported by Higgins and Lawrenz, 1980; however, the projected number of registered nurses may be overestimated.)

Overview of the Present Evaluative Follow-up Study

Unlike the U.S. Public Health Service's 1979 evaluation design, the design for the present research does not make the assumption that AHEC programs will substantially improve the total supply of health professionals in areas where AHEC training was offered.

Instead, the present research measures the impact of the AHEC Project in Minnesota chiefly by looking at the Project's own former participants, particularly U of M medical students, and resident physicians at U of M affiliated hospitals.

The present research is called an "evaluative follow-up" because it attempts to assess Minnesota AHEC Project impact using data from a follow-up study of 1,500 former participants in 30 selected 1972-80 AHEC programs. Selected from the total group of 40 programs funded under the Minnesota AHEC Project, these 30 programs were those that had provided educational experiences for health professional students or resident physicians, and that were judged to have had at least a potential influence on the career location choices of participants.

Conducted during 1980-81, the present research was the first effort to assess directly the impact of the Minnesota AHEC Project on the objective of improved geographic distribution and supply of health professionals in Minnesota. With the exception of physicians (who must travel a training pipeline at least seven years long before exit into professional practice), most of the 1972-79 participants in AHEC programs had completed their professional training, had selected a practice location, and had begun their health care careers.

A variety of archival data sources were used in the present research --i.e., AHEC Project records, the U of M's Central Mail List Services records, U of M departmental records, directories of professional associations, records of Minnesota State boards licensing health professionals-- to seek the current professional location of all 1,500 former participants in the 30 studied AHEC programs.

In addition, all former AHEC-involved medical students and resident physicians were surveyed using mailed questionnaires. Survey topics included current specialty choice and professional activities; ratings of the quality and influence of AHEC programs; and future professional plans, including concept of an ideal medical practice situation in 5 to 10 years, after completion of all training and any required medical service obligations. Archival data sources were used to determine specialty choice of all former AHEC-involved medical students who were not responsive to the survey; and also to determine specialty choice of former medical students in the non-AHEC control group.

The present research provides answers to the following questions:

1. What was the Project's contribution to improved geographic distribution of health professionals?

2. What was the Project's contribution to improved supplies of primary care physicians?

3. What was the Project's contribution to decentralization of health professional training in Minnesota?

4. What was the quality of health professional training offered in programs funded under the Minnesota AHEC Project?

In short, the present research provides some evidence relevant to assessing the Project's success in meeting each of its major objectives: improved distribution and supply of primary care health professionals; decentralized health professional training; and high quality training.

The evidence for improved geographic distribution is direct, in the form of actual practice locations, for those many former AHEC participants who have completed their training. This evidence is indirect, in the form of self-reported intended practice locations, for those former AHEC-involved medical students and residents still in training.

This present research also provides survey evidence relevant to assessing the AHEC Project's success in promoting decentralization of health professional training; the quality of AHEC-supported training; and the influence of AHEC programs on specialty choice and future professional plans. The evidence on quality and influence of AHEC-supported educational experiences is available only for former AHEC-involved medical students and residents, who were the only groups surveyed.

METHOD

This section of the report describes the conduct of the research--including the selection of AHEC programs and subjects for follow-up study; selected demographic information concerning these subjects, who were former participants in AHEC programs; the data-collection methods, including conduct of a paper-and-pencil questionnaire survey; and the selection of a representative, random, "control-group" sample of U of M Medical School students with which to compare AHEC-involved medical students.

A description of the methods for this research is best done in the context of an understanding of the Minnesota AHEC Project.

What Is the Minnesota AHEC Project?

This question includes several more specific questions: What were the various AHEC-supported or AHEC-sponsored programs? What educational experiences were offered? What was the level of participation and the duration for each program?

Programs Funded as Part of the Minnesota AHEC Project

Of the approximately 40 programs supported by the Minnesota AHEC Project from its inception in 1972, 30 programs have been selected for inclusion in this research study. The 30 included programs each provided educational opportunities for health professional students or resident physicians designed to encourage their later professional practice in rural, outstate, or other underserved areas of Minnesota. The remaining programs, not included in this research, were, generally speaking, programs that did not include work with students or resident physicians--for example, curriculum writing projects; programs to provide consultation services to outstate health practitioners; efforts to implement peer review and medical audit techniques in outstate hospitals; brief workshops for medical students on chemical dependency; and research and administrative activities of the U of M AHEC, which is the central office of the Minnesota AHEC Project.

Detailed descriptions of all Minnesota AHEC programs can be found in such reports as those by Feldman et al., Higgins (1979), and in progress reports deliverable under the federal contracts relevant to the Minnesota AHEC Project (e.g., U of M AHEC Program, 1977).

A listing (abbreviated in some cases) and brief description of the 30 Minnesota AHEC programs included in this follow-up research is provided in Table 1.

The Minnesota AHEC Project used its funds to provide different kinds of support for different AHEC programs. For some programs (e.g., Phase D Preceptorships) AHEC provided stipends directly to students to defray expenses of off-campus living; for other programs (e.g., the Rural Physician Associate Program--hereafter called the RPAP program)--AHEC provided funds for faculty supervision of, and visits to, medical students participating in off-campus preceptorships. For some programs, (e.g., rural Phase D Preceptorships) AHEC was the sole source of support. For other programs (e.g., RPAP), substantial funding, in addition to that from AHEC, was received from other (e.g., State) sources.

Undergraduate medical education. Three of the four programs in this category were offered to medical students at the U of M, Minneapolis Campus: 6-week Phase D (third or fourth year) primary care or psychiatry preceptorships with outstate physicians (the setting for the psychiatry preceptorships was a rural community mental health center, the Five-County Human Development Program in Braham, Minnesota); 9-12 month family practice

Table 1

Minnesota AHEC Training Programs Included in the Follow-up Research

Program		Participants		Training				Duration of AHEC funding	
Type	Title	Educational status	N[a]	Type	Content or specialization	Intended setting[b]	Duration of training	From (year)	To (year)
Undergrad. medical education	Phase D Precps	Phase D	81	Precp.	Prim. care, or Psychiat.	Outstate	6 wks.	1974-75	1980-81
	Rural Physician Associate	Phase D (3rd yr.)	227		Fam. Prac., Int. Med.	Rural	9-12 mo.	1974-75	1980-81
	Phase B Precps., UofM, Duluth	Phase B	40		Peds., Fam. Prac.	Duluth & rural	Two 3-5 wk. rots.	1978-79	1979-80
	SAMA/MECO Precps.	Phase A (compltd.)	2		Prim. care	Rural	1 mo.	1972-73 only	
Graduate medical education	Fam. Prac. Res. Rots., UofM, Mpls.	Res.	54	Rot.	Fam. Prac.	Rural	1 mo.	1977-78	1980-81
	Int. Med. Res. Rots.	Res. (2nd yr.)	33		Int. med., amb. care	St. Paul	4-6 mo.	1975-76	1978-79
	Fam. Prac. Res. Rots. Duluth GMEC	Res. (2nd-3rd)	29		Fam. Prac., Others	Duluth & rural	Four 4-6 wk. rots.	1976-77	1979-80
	Pediatric Res. Rots.	Res. (3rd-4th)	16		Peds., amb. care	Mpls.-St. Paul	2-12 mo.	1975-76	1977-78
	Ob-Gyn. Res. Rots.	Res.	3		Ob-Gyn.	Mpls.	4-6 mo.	1977-78 only	
	Psychiatry Res. Rots.	Res.	1		Psychiatry	St. Cloud	6 mo.	1974-75 only	
Dental education	Prev. Dentistry	Dent. stdts.	26	Rot.	Preventive Dentistry	Mpls. Schools	2 wks.	1975-76	1976-77
	Rural Summer Dentistry	Dent. stdts. (3rd-4th)	45	Precp.	Dentistry	Rural (some urb.)	6 wks.	1974-75	1980-81
	Prev. Dent. Hyg.	Dent. Hyg. stdts.	185	Rot.	Preventive Dentistry	Mpls. Schools	2 wks.	1975-76	1976-77
Nursing education	Adult and Geriatric Nurse Assoc.	Non-bacc. RN's	28	Cses.	Nursing	Rural	5 mo.	1972-73	1975-76
	Off-campus Bacc. and Grad. Nursing	RN's	13			Outstate	Several 10 wk. cses.	1974-75 only	
	Career Mobility, Moorhead State U.	Non-bacc. RN's	59			Moorhead area	2 yrs.	1975-76	1976-77
	Career Mobility, Coll. of St. Ben.	Non-bacc. RN's	64			Rural cent. MN	Dep. on experience	1975-76	1976-77
	Part. External Master's, Sch. of Nursing	Bacc. RN's	148			Rochester, Duluth	Several 10-wk. cses.	1976-77	1980-81
	Part. External Master's, Sch. of Pub. Hlth.	Bacc. RN's	19			Mankato	Several 10-wk. cses.	1978-79 only	
Pharmacy education	Clinical Pharmacy	Pharm. D stdts.	23	Rot.	Pharmacy	Rural cent. Mn	1-2 mo.	1974-75	1978-79
	Field Instruction Media	Pharm. stdts. (5th)	82	Cses.		Rural	9-12 wks.	1976-77 only	
	Rural Pharmacist Associate	Pharm. & Pharm. D	11	Precp. or Rot.		Fergus Falls area	4-12 wks.	1974-75	1977-78
Allied health education	Modular Dietetic Traineeship	Dietetics stdts.	51	Trainee-ship	Dietetics	Duluth, St. Cloud, etc.	12 mo.	1974-75	1978-79
	Occ. Therapy Rural Rots.	Occ. Ther. stdts.	38	Rot.	Occ. Ther.	Outstate	3 mo.	1974-75	1978-79
	Phy. Therapy Rural Rots.	Phy. Ther. stdts.	63	Rot.	Phy. Ther.	Outstate	2-4 wks.	1974-75	1978-79
	Social Dvlpmt., UofM, Duluth	Soc. Wk. stdts.	4	Rot.	Agency work	Outstate	10 wks.	1975-76	1976-77
Inter-disciplinary education	Comm-U. Hlth Care Ctr.	Many fields, levels	52	Rot.	Prim. care clinic	Mpls.	10 wks. or more	1977-78	1978-79
	5-County Human Dvlpmt., Braham	Many fields, levels	81	Rot.	Comm. mental hlth.	Braham	4-12 wks.	1973-74	1980-81
	Mat Polinsky Rehab. Ctr., Duluth	Occ. & Phy. Ther., Soc. Wk.	16	Rot.	Rehab. ctr.	Duluth	1-3 mo.	1975-76	1976-77
	Interdis. Summer, UofM, Mpls., Duluth	Many fields, levels	54	Cses.	Team projects	All of MN	10-20 wks.	1976-77	1977-78

Note. A number of program titles and terms have been abbreviated for this table. See text for full title of program. Abbreviated terms include the following: precp.=preceptorship, rot.=rotation, prim. care=primary care, res.=residency or resident physician, amb. care=ambulatory care, bacc.=baccalaureate, RN=registered nurse, cses.=courses.

[a] For each program, unduplicated counts of students are shown (students repeating a program are counted only once). For 3 programs--Phase D Preceptorships, the Rural Physician Associate Program, and Family Practice Residency Rotations at the UofM, Minneapolis--counts for the period September, 1972-June, 1980. For all other programs, counts are for the period September, 1972-October, 1979. The total unduplicated count of all participants in these programs, during these periods is 1,504. The total unduplicated count of all participants through October, 1981, is expected to be nearly 2,000.

[b] The terms "outstate" and "rural" differ. Outstate refers to a location outside the Minneapolis-St. Paul Twin Cities metropolitan area; hence, an outstate location could be metropolitan (e.g., Duluth-Superior, Rochester, Fargo-Moorhead). Rural refers to a location outside a metropolitan area (see text for definition of metropolitan).

[c] During the 1978-79 contract year, the title of this program was changed to Rural and Innercity Dental Program, reflecting the fact that some students took preceptorships with metropolitan-area dentists. During the period 1979-81, this program has the title, Dental Preceptorship Program.

or internal medicine preceptorships as part of the Rural Physician Associate Program (RPAP); and one-month primary care preceptorships for two 1972-73 Phase B (second-year) students participating in the Student American Medical Association-Medical Education Orientation (SAMA-MECO). The remaining program consisted of Phase B preceptorships in pediatrics and family practice for second-year medical students at the U of M, Duluth Campus.

Graduate medical education. The following programs offered 1-6 month preceptorships or training rotations to resident physicians based in Minneapolis residency programs affiliated with the U of M: rural Family Practice Residency Rotations; Internal Medicine Residency Rotations offered at St. Paul United Hospitals; Pediatric Residency Rotations; Obstetrics and Gynecology Residency Rotations; and a single residency rotation at St. Cloud in psychiatry. Another program of family practice residency rotations was offered in Duluth, to participants in the residency program developed by the Duluth Graduate Medical Education Council, Inc.

Dental Education. The Rural Summer Dentistry Program (which became in 1978-79 the Rural and Inner-City Dental Program) offered dental students, during the summer between their third and fourth year of study, the opportunity to work as a dental auxiliary under the supervision of a rural (or inner-city) dentist. The Preventive Dentistry and Preventive Dental Hygiene programs were jointly administered, cooperative programs under which teams of dental students and dental hygiene students, respectively, provided dental screening, prophylaxis, and referral services, in Minneapolis Public School settings, for disadvantaged children.

Nursing education. All of the AHEC-supported programs in this category provided registered nurses with off-campus courses and nurse practitioner training. These programs were designed to assist the career mobility of rural Minnesota nurses, without requiring them to spend extensive study time in the Twin Cities or other urban areas away from their jobs.

Four programs were offered by the University of Minnesota, Minneapolis Campus: the Adult and Geriatric Nurse Associate Program for non-baccalaureate registered nurses in the St. Cloud, Wadena, and Bemidji areas; the Off-Campus Baccalaureate and Graduate Nursing Education Program, for registered nurses with all levels of academic preparation; the Partially External Master's Program in the School of Nursing; and the Partially External Master's Program offered by the School of Public Health.

Two AHEC-supported Career Mobility Programs were offered at non-U of M campuses--Moorhead State University and the College of St. Benedict--to non-baccalaureate registered nurses. These programs also permitted nurses to earn academic credit toward a bachelor's degree.

Pharmacy education. The Clinical Pharmacy Program offered clinical rotations in rural central Minnesota to U of M doctoral students in pharmacy (Pharm. D. students). The Rural Pharmacist Associate Program provided preceptorships and rotations to undergraduate and graduate (Pharm. D.) students, respectively, in the Fergus Falls area. The Field Instruction Media Program provided a self-study, off-campus extension-type curriculum in advanced pharmacy to fifth-year pharmacy students taking clinical training rotations in rural areas.

Allied health education. AHEC supported one-year Modular Dietetic Traineeships at the U of M, consisting of a student-selected sequence of several rotations at different institutions in Minnesota. U of M students in occupational therapy, physical therapy--and several students in social work--also had AHEC-supported opportunities to work under supervision in outstate hospitals and agencies.

Interdisciplinary education. Each of these programs offered opportunities, during clinical training or course work, for significant off-campus cooperation among health professional students in different areas, solving important health care problems. The AHEC Project supported rotations for students in many health professional fields at the Community-University Health Care Center, a primary-care clinic serving Indian Americans and other economically disadvantaged people in a low-income area of Minneapolis; and also at the Five-County Human Development Program, Inc., a rural community mental health center at Braham, Minnesota. Students in occupational therapy, physical therapy, and social work had the AHEC-supported opportunity to work together at the Nat Polinsky Rehabilitation Center in Duluth. The AHEC-supported Special Summer Field Instruction Course on Interdisciplinary Team Building, taught by faculty from the Minneapolis and Duluth campuses of the U of M, required students to cooperate in interdisciplinary teams to study and help solve health care problems in a field setting.

Summary of programs. A total of 30 different AHEC-supported programs--involving health professionals in training, and attempting to influence their career choices--were included in the follow-up research. Tables 1 and 2 show the years from 1972 through 1980 during which each program received AHEC funding. Table 2, in addition, shows the yearly

Table 2

Participation in AHEC Programs: The Follow-up Sample

Program: Type	Program: Title	Year of participation: 1972-73 (1)	1973-74 (2)	1974-75 (3)	1975-76 (4)	1976-77 (5)	1977-78 (6)	1978-79 (7)	1979-80 (8)	Total participation for each program	Unduplicated count of participants for each program
Undergrad. medical education	Phase D Precps.	--	--	3	8	12	23	28	9[a]	83	81
	Rural Physician Associate	--	--	32	40	40	38	37	40	227	227
	Phase B Precps. UofM, Duluth	--	--	--	--	--	--	40	--[c]	40	40
	SAMA/MECO Precps.	2	--	--	--	--	--	--	--	2	2
Graduate medical education	Fam. Prac. Res. Rots., UofM, Mpls.	--	--	--	--	--	21	26	8[c]	55	54
	Int. Med. Res. Rots.	--	--	--	9	12	11	7	--	39	33
	Fam. Prac. Res. Rots., Duluth GMEC	--	--	--	--	12	15	14	--[c]	41	29
	Pediatric Res. Rots.	--	--	--	8	5	6	--	--	19	16
	Ob-Gyn. Res. Rots.	--	--	--	--	--	3	--	--	3	3
	Psychiatry Res. Rots.	--	--	1	--	--	--	--	--	1	1
Dental education	Prev. Dentistry	--	--	--	6	19	--	1	--	26	26
	Rural Summer Dentistry	--	--	2	5	11	7	20	--[c]	45	45
	Prev. Dent. Hyg.	--	--	--	63	123	--	--	--	186	185
Nursing education	Adult and Geriatric Nurse Assoc.	13	6	--	9	--	--	--	--	28	28
	Off-campus Bacc. and Grad Nursing	--	--	13	--	--	--	--	--	13	13
	Career Mobility, Moorhead State U.	--	--	--	45	16	--	--	--	61	59
	Career Mobility, Coll. of St. Ben.	--	--	--	21	58	--	--	--	79	64
	Part. External Master's, Sch. of Nursing	--	--	--	--	70	32	75	--[c]	177	148
	Part. External Master's, Sch. of Pub. Hlth.	--	--	--	--	--	--	19	--	19	19
Pharmacy education	Clinical Pharmacy	--	--	9	--	2	4	8	--	23	23
	Field Instruction Media	--	--	--	--	82	--	--	--	82	82
	Rural Pharmacist Associate	--	--	2	3	--	6	--	--	11	11
Allied health education	Modular Dietetic Traineeship	--	--	6	9	12	12	12	--	51	51
	Occ. Therapy Rural Rots.	--	--	1	8	23	3	3	--	38	38
	Phy. Therapy Rural Rots.	--	--	6	14	10	22	11	--	63	63
	Social Dvlpmt., UofM, Duluth	--	--	--	1	3	--	--	--	4	4
Inter-disciplinary education	Comm-U. Hlth Care Ctr.	--	--	--	--	--	20	32	--	52	52
	5-County Human Dvlpmt., Braham	--	9	7	15	16	16	17	1[c]	81	81
	Mat Polinsky Rehab. Ctr. Duluth	--	--	--	5	11	--	--	--	16	16
	Interdis. Summer, UofM, Mpls., Duluth	--	--	--	--	32	22	--	--	54	54
Total participation for year		15	15	82	269	569	261	350	58[c]	1619	1548
Unduplicated count of participants for each year[b]		15	15	82	269	568	258	346	58[c]	--	1504[d]

Note. See general note for Table 1. For 3 programs--Phase D Preceptorships, the Rural Physician Associate Program, and the Family Practice Residency Rotations at the UofM, Minneapolis--counts are for the period September, 1972-June, 1980. For all other programs, counts are for the period September, 1972-October, 1979. Thus, as noted below, a number of students and residents participating in AHEC during the period October, 1979-October, 1980, were not included in the follow-up sample and were not tabulated here.

[a] Participants repeating the same program are counted only once.

[b] Participants in more than one AHEC program during the same year are counted only once.

[c] Counts of participating in these programs are incomplete, since participants in only several of the 1979-80 AHEC programs (and through June, 1980) were included in the follow-up sample. The total participation in AHEC programs during 1979-80 was actually 315. The unduplicated count of participants for 1979-80 is estimated to be about 285.

[d] This is the total unduplicated count of all participants in all programs during the periods here specified; in short, this is the total *N* in the follow-up sample.

participation in each program, 1972-80.

Table 2 reflects the fact that the first three years of the AHEC Project, 1972-75, included much planning and development of programs, with substantial student involvement coming during the 1975-76 academic year. The zenith year for student participation was 1976-77, when 568 different students participated in 20 different programs.

During its ninth and final year, which has not been studied in this research, the AHEC Project provided support for six programs that trained about 200 students and residents. These programs are Phase D Preceptorships and the RPAP for medical students; the U of M Family Practice Residency Rotations; the Dental Preceptorship Program (formerly the Rural and Inner-city Dental Program); the Partially External Master's Degree Program in the School of Nursing; and the interdisciplinary program of mental health rotations and preceptorships at the Five-County Human Development Program, Inc., in Braham, Minnesota.

The Follow-up Sample: Who Were the AHEC Participants Studied in this Research?

The participants who were subjects of this research were those approximately 1,500 former students and resident physicians participating in one or more of the 30 selected AHEC-supported programs during the period under study. This period was September, 1972, through October, 1979, for most programs. For three programs, however--Phase D Preceptorships, RPAP, and U of M Family Practice Residency Rotations--the period covered was extended through June, 1980. In short, this follow-up research studies participants during the first 7-7½ years of the 9-year Minnesota AHEC Project.

The Follow-up Sample, 1972-80, vs. the Total Group of AHEC Participants, 1972-81

It must be emphasized that the follow-up sample of about 1,500 former AHEC participants represents only about half of the total estimated group of over 3,000 expected to have taken part in AHEC programs as of the end of the Minnesota Project in October, 1981.

Again, the Minnesota AHEC Project, from its start in 1972, has provided a total of about 2,400 different health professional training experiences for about 2,200 different students and resident physicians. In addition, the AHEC Project has brought continuing education seminars and other educational presentations to rural and outstate Minnesota for over 1,000 already practicing health professionals.

In short, the follow-up sample represents those:

1. Approximately 1,500 (or about half) of the total group of all AHEC participants;

2. Who participated during specific periods, 1972-80, in 30 programs selected from the total of 40 Minnesota AHEC programs; and

3. Who represent 1,580 (or about half) of the total number of different training experiences offered by the Project during its lifespan.

The Classification of Follow-up Groups of Former AHEC Participants

The approximately 1,500 former participants in the 30 studied AHEC programs were classified into 15 mutually exclusive follow-up groups. This categorization of follow-up groups for research study was done for several reasons: (a) to simplify the presentation of research results (instead of having 30 different programs for follow-up purposes, there are now 15 different follow-up groups); (b) to simplify the conduct of the follow-up research; (c) to take account of the fact that 8% of former

AHEC-involved students and residents had participated in more than one AHEC program; and (d) to reflect the fact that there were groups of very similar AHEC-supported programs--programs that tended to enroll the same types of students or participants, and which had similar objectives and training methods.

The 15 follow-up groups were defined largely on the basis of chosen occupation or training program as of AHEC-program participation. Also used to classify former AHEC participants were the type of AHEC program taken (e.g., rural rotations vs. urban rotations) and the stage of training when participating in an AHEC program (e.g., Phase B, or second-year of Medical School, vs. Phase D, or third-fourth year of Medical School.

The correspondence between the 15 follow-up groups and the 30 studied AHEC programs is shown in Table 3, which shows participation in various AHEC programs by different follow-up groups.

This reorganization of the follow-up sample from categorization by program (see Tables 1 and 2) to categorization by occupation or discipline (see Table 3) is useful but can, of course, lead to oversimplified perceptions of the AHEC Project. Table 3 shows that many students and resident physicians participated in more than one AHEC program in their own discipline, and many others participated in interdisciplinary education programs. Table 2 shows again that 8% of participants took more than one AHEC program.

A number of the 15 follow-up groups represent subdivisions of larger occupational discipline groupings.

The fact that some participants took more than one AHEC program, in practice, created very few classification problems, since repeat par-

Table 3

Participation in Various AHEC Training Programs
by Different Follow-up Groups of AHEC Participants

Program		Medical students and residents						Dental students				Nursing students							Stdts. in soc. work, other fields, took interdisciplin. prog.			
		Medical students																				
Type	Title	Phase B (N=36) %	Phase D (N=80) %	RPAP (N=227) %	Total (N=343) %	Res.[b] (N=122) %	Total, med. stdts. res.[c] (N=488) %	Took urban rot. (N=27) %	Took rural rot. (N=45) %	Total (N=72) %	Dent. hyg. stdts. (N=185) %	Took non-UofM cses. (N=123) %	Took UofM cses. (N=224) %	Total (N=347) %	Pharm. stdts. (N=128) %	Diet. stdts. (N=51) %	Occ. ther. stdts. (N=44) %	Phy. ther. stdts. (N=70) %	Took urban rot. (N=29) %	Took out-state prog. (N=85) %	Total (N=114) %	Total, all AHEC participants (N=1,499) %
Undergrad. medical education	Phase D Procps.		100	0[a]	24		17															5
	Rural Physician Associate			100	66		47															15
	Phase B Procps., UofM, Duluth	96	1	2	12		8															3
	SAMA/MECO Procps.	6			1		0[a]															0[a]
Graduate medical education	Fam. Prac. Res. Rots., UofM, Mpls.		1	3	2	38	11															4
	Int. Med. Res. Rots.					27	7															2
	Fam. Prac. Res. Rots., Duluth GMEC		1	2	2	19	6															2
	Pediatric Res. Rots.					13	3															1
	Ob-Gyn. Res. Rots.					3	1															0[a]
	Psychiatry Res. Rots.					1	0[a]															0[a]
Dental education	Prev. Dentistry							96		36												2
	Rural Summer Dentistry								100	63												3
	Prev. Dent. Hyg.										100											12
Nursing education	Adult and Geriatric Nurse Assoc.											1	12	8								2
	Off-campus Bacc. and Grad. Nursing											1	5	4								1
	Career Mobility, Moorhead State U.											48		17								4
	Career Mobility, Coll. of St. Ben.											52		18								4
	Part. External Master's, Sch. of Nursing											2	65	43								19
	Part. External Master's, Sch. of Pub. Hlth.												9	6								1
Pharmacy education	Clinical Pharmacy														18							2
	Field Instruction Media														64							6
	Rural Pharmacist Associate														9							1
Allied health education	Modular Dietetic Traineeship															100						3
	Occ. Therapy Rural Rots.																86					3
	Phy. Therapy Rural Rots.																	90				4
	Social Dvlpmt., UofM, Duluth																			5	4	0[a]
Inter-disciplinary education	Comm-U. Hlth Care Ctr.						1						1	1	9				100		25	3
	5-County Human Dvlpmt., Brahan		14	2	4		6						4	2	1		5			30	29	5
	Mat Polinsky Rehab. Ctr., Duluth		1		0[a]		0[a]						0[a]	0[a]						15	11	1
	Interdis. Summer, UofM., Mpls., Duluth							4		1			4	2			9	10		40	30	4

Note. See general notes for Table 1. Column percentages do not necessarily total 100, of course, since one purpose of this table is to document individuals' participation in more than one AHEC program. Because they could not be classified into a follow-up group (because occupational program was not known), 5 former participants are not included in this table. The column headings show the 15 mutually exclusive follow-up groups of former AHEC-program participants, defined largely on the basis of their chosen occupation as of AHEC participation. Several occupational groups were, however, broken down into smaller groups, each judged to have unique AHEC-sponsored experiences. While these occupational groupings are convenient for presentation of results, the groupings necessarily ignore the fact that some AHEC participants took AHEC programs--for example, interdisciplinary or mental health programs--outside their own occupational interest area.

[a] Less than 1%, but equal to, or greater than, N=1.

[b] Includes only those resident physicians who had not previously participated in an AHEC-supported undergraduate medical education program (e.g., Phase D, RPAP). Former participants in both AHEC-supported undergraduate medical education programs and AHEC-supported graduate medical school education programs--such participants were classified into follow-up groups according to their undergraduate AHEC program experience.

[c] Includes an additional 23 former medical students and residents participating in AHEC-supported interdisciplinary programs.

ticipants tended to take another similar AHEC program. A number of students in traditional health-care fields (e.g., medicine, dentistry, nursing, pharmacy, occupational therapy, and physical therapy) took interdisciplinary programs outside their own occupational field. Such students were, however, classified with their own occupational group, not with the interdisciplinary follow-up group (see below).

Former medical students and resident physicians, constituting the largest single group of AHEC participants, were classified into four mutually exclusive follow-up groups, according to the specific AHEC programs in which they participated. (Many analyses also employ further subclassification by year of graduation from the U of M Medical School--i.e., 1974-77 graduates vs. 1978-81 graduates.)

The following paragraphs describe the four follow-up groups of medical students and resident physicians.

Phase B medical students are former second year U of M medical students who participated in the AHEC-supported Phase B Preceptorships while enrolled at the Duluth Campus, or who participated in a Student American Medical Association-Medical Education Community Orientation (SAMA/MECO) Preceptorship--but who had not participated in any other AHEC-sponsored undergraduate medical education program as of June, 1980.

Phase D medical students are former third- and fourth-year U of M medical students participating in an AHEC-sponsored Phase D Preceptorship.

RPAP medical students have participated in the U of M's Rural Physician Associate Program. (This group also includes one former student who took both Phase D and RPAP AHEC-supported preceptorships.)

Resident physicians had participated in an AHEC-supported residency rotation but had not previously participated in an AHEC-supported undergraduate medical education program.

Note from Table 3 that 3% (N=7) of former RPAP students also took AHEC-supported rural rotations during their residency training. These residency rotations were coordinated by the U of M's Department of Family Practice and Community Health. These seven physicians were classified as part of the RPAP follow-up group, not the resident physician follow-up group.

The decision to give priority to AHEC-supported undergraduate Phase D training experiences (the RPAP or Phase D Preceptorships Program) over AHEC-supported Phase B or residency training experiences in assigning former AHEC-involved medical students to follow-up groups--this decision was based on the assumption that these Phase D experiences, by their timing in the student's training, and by their length and intensity, had the potential for being key formative experiences in the career development of student physicians. In short, the assumption was made that these Phase D experiences had greater potential than either earlier Phase B experiences or later residency rotations for influencing the career decisions of medical students toward primary care in rural and underserved areas. Two follow-up groups were formed based on participation in AHEC-supported Phase D training experiences: the 80 members of the Phase D follow-up group had all participated in a six-week Phase D Preceptorship; the 227 members of the RPAP group had all participated in a 9-12 month preceptorship in the Rural Physician Associate Program. There was virtually no overlap between the Phase D and RPAP groups; the single student who had participated in both programs was assigned to the RPAP group.

Classification of dental students. Dental students could easily be classified into two non-overlapping groups. Dental students who took an urban rotation had participated in the Preventive Dentistry Program operating in the Minneapolis Public Schools. Dental students who took rural rotations had participated in the Rural Summer Dentistry Program.

Classification of nursing students. Nursing students were classified into those registered nurses who predominantly took non-U of M courses (namely, participants in the Career Mobility Programs at Moorhead State University and the College of St. Benedict) vs. registered nurses who only took AHEC-supported U of M courses as part of their participation in the following programs--the Adult and Geriatric Nurse Associate Program, the Off-Campus Baccalaureate and Graduate Nursing Education Program, the Partially External Master's Program in the School of Nursing, and the Partially External Master's Program offered by the School of Public Health. This division of nursing students into those taking U of M courses vs. those taking non-U of M courses was very distinct; however, several of the 123 nursing students in the non-U of M group did take U of M courses in addition to their work at Moorhead State or St. Benedict.

At least some medical students, resident physicians, dental students, dental hygiene students, nursing students, pharmacy students, occupational therapy students, and physical therapy students took AHEC-supported interdisciplinary education programs in addition to AHEC-supported programs specifically designed for their own special health professional field.

Interdisciplinary education student follow-up group. In addition to the health professional students and resident physicians mentioned above who took interdisciplinary training programs, there were other students in social work and other health and human services fields not previously listed (for example, clinical psychology, school psychology, Indian Studies, Public Health Nutrition, Health Education, Health Care Administration, speech and communication, chemical dependency counseling) who also took AHEC-supported interdisciplinary education programs. These other students in social work and other health and human services fields constitute the follow-up groups of interdisciplinary education students. Interdisciplinary education students who took an urban rotation were those who had participated in the AHEC-supported program at the Community-University Health Care Center. Interdisciplinary education students who took an outstate program had taken the AHEC-supported Special Summer Field Instruction Course on Interdisciplinary Team Building, or had taken a training experience at either the Five-County Human Development Program's mental health center at Braham, Minnesota, or at the Nat Polinsky Rehabilitation Center in Duluth. There was no overlap between these two groups of interdisciplinary education students.

Number of different AHEC programs taken by participants in different follow-up groups. Table 4 and Table 2 both represent the same basic fact; namely, 8% of AHEC participants took more than one AHEC program. That is, 8% took two or more different AHEC-supported programs, or else took the same AHEC program at least twice. An example of a participant taking the same program twice would be a medical student who took two different preceptorships at two different locations while participating twice in the Phase D Preceptorship Program. Table 2 shows the unduplicated count of AHEC participants in each of the 30 studied AHEC programs. Table 4 shows (in its column headings) the unduplicated count of AHEC participants in each of the 15 mutually exclusive follow-up groups.

Table 4

Number of Different AHEC Programs Taken by Participants

Number of programs	Medical students and residents						Dental students				Nursing students							Stdts. in soc. work, other fields, took interdisciplin. prog.			
	Medical students																				
	Phase B (N=36) %	Phase D (N=80) %	RPAP (N=227) %	Total (N=343) %	Res.[b] (N=122) %	Total, med. stdts, res.[c] (N=488) %	Took urban rot. (N=27) %	Took rural rot. (N=45) %	Total (N=72) %	Dent. hyg. stdts. (N=185) %	Took non-UofM cses. (N=123) %	Took UofM cses. (N=224) %	Total (N=347) %	Pharm. stdts. (N=128) %	Diet. stdts. (N=51) %	Occ. ther. stdts. (N=44) %	Phy. ther. stdts. (N=70) %	Took urban rot. (N=29) %	Took out-state prog. (N=85) %	Total (N=114) %	Total, all AHEC participants (N=1,499) %
1	100	74	89	86	83	86	100	100	100	100	84	87	86	99	100	100	100	100	100	100	92
2	0	25	10	13	17	14	0	0	0	1	15	13	14	1	0	0	0	0	0	0	8
3 or more	0	1	1	1	0	1	0	0	0	0	1	0[a]	1	0	0	0	0	0	0	0	0[a]

Note. See Table 1 for definitions of AHEC programs. See Table 3 for description of follow-up groups of participants.

[a] Less than 1%, but equal to, or greater than, *N*=1.

[b,c] See footnotes b and c for Table 3.

Table 4 is illustrative of many subsequent tables in the report--in its column headings and in the fact that the numerical entries in the body of the table are all percentages of the total number of persons (the N's in the column headings) in each follow-up group.

Table 4 shows that virtually the only follow-up groups with substantial participation in more than one AHEC program were medical students, resident physicians, and nursing students. One-fourth of the Phase D medical student group took more than one AHEC program. Percentages of about 10-15% of the RPAP, resident physician, and nursing student groups participated in more than one AHEC program, or took the same program twice or more.

Data Collection

For all 15 follow-up groups, an attempt was made to determine current professional location as of early to middle 1980. Archival data sources used to obtain addresses included AHEC Project records, the U of M's Central Mail List Services Department, U of M departmental records, directories of professional associations, and records of Minnesota State boards licensing health professionals.

Current professional location was defined as the best available practice address, based on self-report (for surveyed follow-up groups) or archival records. For former participants still in training, current professional location was defined as the main training or residency site. Home address was used if professional location was unknown, and if one could assume that home and professional location were the same or nearby.

Some other demographic information on these studied former AHEC participants was also gathered from the above archival sources.

Selected Demographic Characteristics of the Studied Former AHEC Participants

Information on sex was available for about 80% of the total follow-up sample of about 1,500. This total group apparently had nearly equal male-female representation: 39% male; 43% female; and 19%, sex unknown.

Among former medical students, resident physicians, and dental students participating in AHEC programs, the proportion of males was higher, however, about 80-90%. Also--judging from former AHEC participants--nursing, dental hygiene, and occupational therapy are occupations predominantly filled by women.

Information on other demographic characteristics such as race, age, marital status, and hometown was available for former medical students and residents (because of the survey), but was generally unavailable for other follow-up groups.

The average (arithmetic mean) age of former medical students and residents was about 29, as of the survey in mid-1980--with the Phase B follow-up group being generally three years younger, and the resident physicians being generally two years older, than this overall average age.

Only about 1% of the entire group of former medical students and residents represented racial minority groups: three former participants were Mexican-American or Chicano, and two were Asian-American. No AHEC-involved medical students and residents in the sample are Black Americans. Race information was unavailable for about one-fourth of former medical students and residents.

Two-thirds of the former medical students and residents responding to the AHEC survey reported being married. Half or more of each separate follow-up group of former medical students and residents also reported being married: 50% of the Phase B and Phase D follow-up groups, 70% of the RPAP group, and about 80% of the resident physican group reported themselves married.

Survey of AHEC-Involved Medical Students and Resident Physicians

Because of budget and time constraints, this research and this report focuses heavily on approximately 500 AHEC-involved medical students and resident physicians. In addition to archival follow-up, data collection for the four follow-up groups of medical students and residents included a mailed, paper-and-pencil survey.

In short, these 500 former medical students and residents were the only former participants surveyed--and they were the only former participants asked to rate their AHEC experiences and to describe their current professional activities and future plans.

The questionnaire and cover letter sent to most of the surveyed medical students and residents are reproduced as Appendix A to this report. (The questionnaires for 1979-80 participants in AHEC-supported undergraduate and graduate medical education programs were modified slightly, but contained nearly all questions shown in Appendix A.)

Note that the content of this questionnaire survey included current specialty choice and professional activities; current location; hometown location; ratings of the quality and influence of AHEC programs; and future professional plans, including concept of an ideal medical practice situation in 5-10 years, after completion of all training and any required medical service obligations.

Archival data sources were used to determine specialty choice of all former AHEC-involved medical students who were not responsive to the survey; and also to determine specialty choice of former medical students in the non-AHEC control group, described in the following paragraphs.

A "Control" or Comparison Group of Non-AHEC Medical Students

To determine whether AHEC-involved U of M medical students differed from their non-AHEC peers in choice of specialty and practice location, a "control" or comparison group was selected, consisting of 200 U of M medical students non participating in AHEC-supported undergraduate medical education programs.

From each of four Medical School classes--1976, 1977, 1978, and 1979--a sample of 50 students was chosen so as to fairly represent the entire group of 200-230 non-AHEC students within that class.

For each class, both the non-AHEC sample and the entire non-AHEC class membership had the same distribution (a) of men vs. women (about 80% vs. 20%); (b) of students choosing family practice vs. other primary care specialties vs. all other specialties; (c) of hometown addresses (as of graduation) in the Twin Cities vs. outstate Minnesota vs. outside Minnesota; (d) of students selecting residency programs in Minnesota vs. outside Minnesota. Information needed to stratify the non-AHEC random sample was obtained from Medical School graduation lists.

Classification of Communities by Type and Size

Scales were developed for this research so that each professional location, course or rotation location, or hometown location could be classified by both type of community and size of community.

Community data from the U.S. Bureau of the Census were used to assign a particular size and type category to each location. For Minnesota communities, 1972 U.S. Bureau of the Census data were used; for communities outside Minnesota, 1978 data were used.

RESULTS

The results of this evaluative follow-up research will be presented as answers to the four major research questions previously asked: (1) What was the Minnesota AHEC Project's contribution to improved geographic distribution of health professionals? (2) To improved supplies of primary care physicians? (3) To decentralization of health professional training in Minnesota? And (4) What was the quality of health professional training offered in AHEC Project programs?

In other words, the results of this evaluative follow-up research are classified according to the major Minnesota AHEC Project objective whose attainment they document.

Again, these three major objectives were high quality training for health professionals; improved supply and geographic distribution of health professionals, particularly those in primary care; and decentralization of health professional training. The objective of improved distribution and supply of health professionals will be treated here as two objectives.

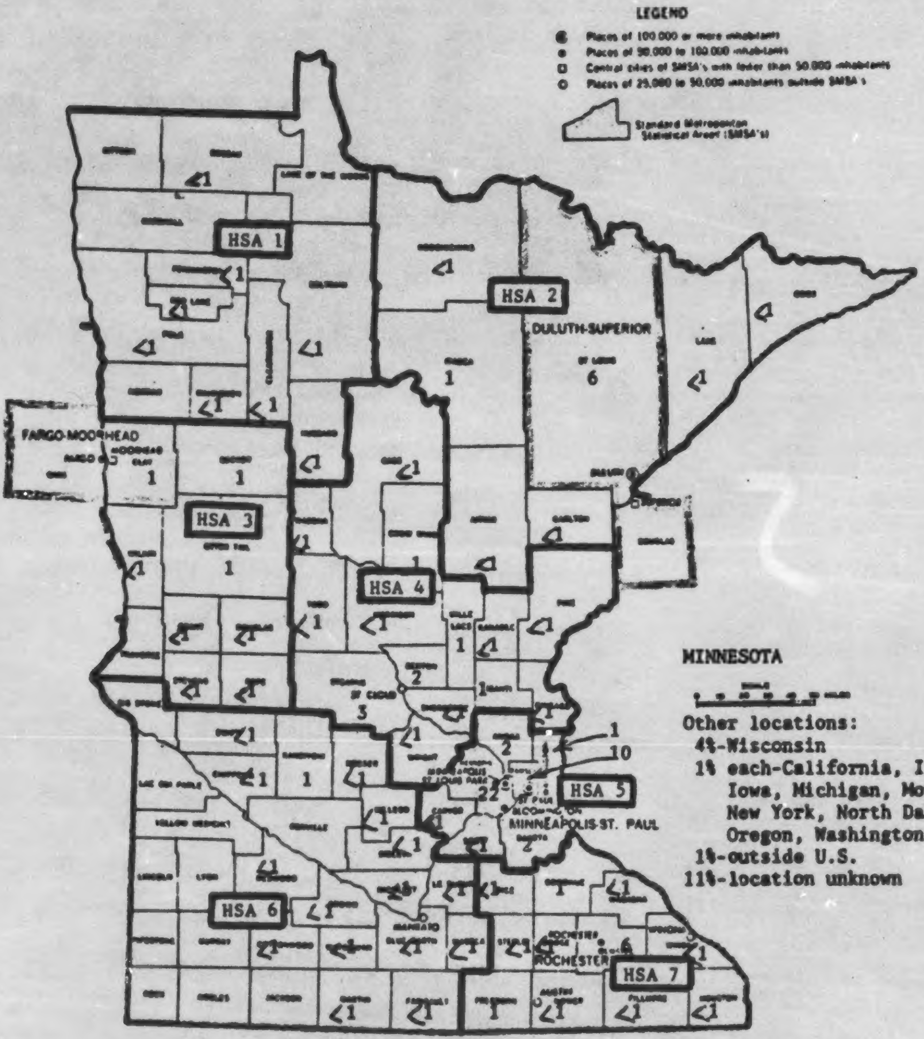
1. What was the Minnesota AHEC Project's Contribution to Improved Geographic Distribution of Health Professionals?

This subsection will discuss the following topics related to geographic distribution of health professionals: (a) the current (1979 or 1980) professional locations of former participants in Minnesota AHEC programs, for those former participants believed to have completed their professional training; (b) the intended future practice locations of former AHEC-involved medical students and resident physicians; and (c) available evidence concerning the impact of the Minnesota AHEC Project on the intended future practice locations of former medical students and resident physicians participating in AHEC programs.

Current Professional Locations of Former Participants in Minnesota AHEC Programs

About 40% of those 1,120 studied former participants believed to have completed their professional training as of 1980 are currently (as of 1980) located in Health Service Area (HSA) 5 (called Metropolitan). (See Figure 2.) HSA 5 includes the five-county Minneapolis-St. Paul Standard Metropolitan Statistical Area (SMSA), designated by U.S. Bureau of the Census (1972).

As of mid-1980, only 22% (108) of the total group of 488 former AHEC-involved medical students and residents were known (by means of the AHEC survey) to have completed their residency training. Nearly half of the 488 were apparently still in training in Hennepin and Ramsey counties (at the U of M Medical School; or in a U of M-affiliated or other residency program).


LEGEND
● Places of 100,000 or more inhabitants
• Places of 50,000 to 100,000 inhabitants
□ Central cities of SMSA's with fewer than 50,000 inhabitants
○ Places of 25,000 to 50,000 inhabitants outside SMSA's
Standard Metropolitan Statistical Areas (SMSA's)
HSA 1
HSA 2
HSA 3
HSA 4
HSA 5
HSA 6
HSA 7
DULUTH-SUPERIOR
FARGO-MOORHEAD
MINNEAPOLIS-ST. PAUL
ROCHESTER
ST CLOUD
MANKATO
MINNESOTA

Other locations:
4%-Wisconsin
1% each-California, Illinois, Iowa, Michigan, Montana, New York, North Dakota, Oregon, Washington
1%-outside U.S.
11%-location unknown

Figure 2. Current professional location of follow-up groups of former participants in AHEC programs. Number entries are percentages of 1,120, the total of AHEC participants believed to have completed their professional training as of 1980.* Only 22% (108) of 488 former AHEC-involved medical students and residents were known to have completed residency training; these 108 are the only former medical students and residents included in this figure. HSAs are Health Service Areas (only Minnesota portions of interstate HSAs are shown). (Map adapted from U.S. Bureau of Census, 1972, p. 25-501)

*Includes participants in only 30 of 40 AHEC Programs, and only to 1979-80 (see Method section).

Of the 108 residency completers, who presumably have taken their first practice location, about three-fourths are currently practicing in Minnesota. About half are practicing in HSA 5 (see Figure 3). (Some, of course, may be just finishing a Twin Cities residency and may be seeking an outstate practice location.) The remaining 22% in Minnesota are scattered over a wide area, with a slight concentration in HSA 2 (Western Lake Superior; which contains Duluth). There is no representation in HSA 1 (Agassiz), in the highly underserved northwest corner of the State.[1] Nearly 30% of this residency completer group is apparently practicing outside Minnesota, with the largest number (10) in Wisconsin.

A better estimate of AHEC impact on the professional location of former AHEC-involved medical students and residents is gained by looking at intended future practice locations. Because of the typical seven-or-more-year period of medical education, many AHEC participants are still in training; and even those who have completed residencies may not have yet chosen stable practice locations.

Among 72 former AEHC-involved dental students, 82% are located professionally in Minnesota (60% in HSA 5), and 15% in other states (see Figure 4).

Among 347 registered nurses formerly in AHEC programs, an estimated 80-85% are still located in Minnesota. These registered nurses are rather evenly distributed over the entire State (except that few are in HSA 1; see Figure 5). Unlike physicians and dentists, AHEC-involved registered nurses tend to be located outside HSA 5. Probably only about 10% are currently located in Hennepin and Ramsey counties. (Estimates are

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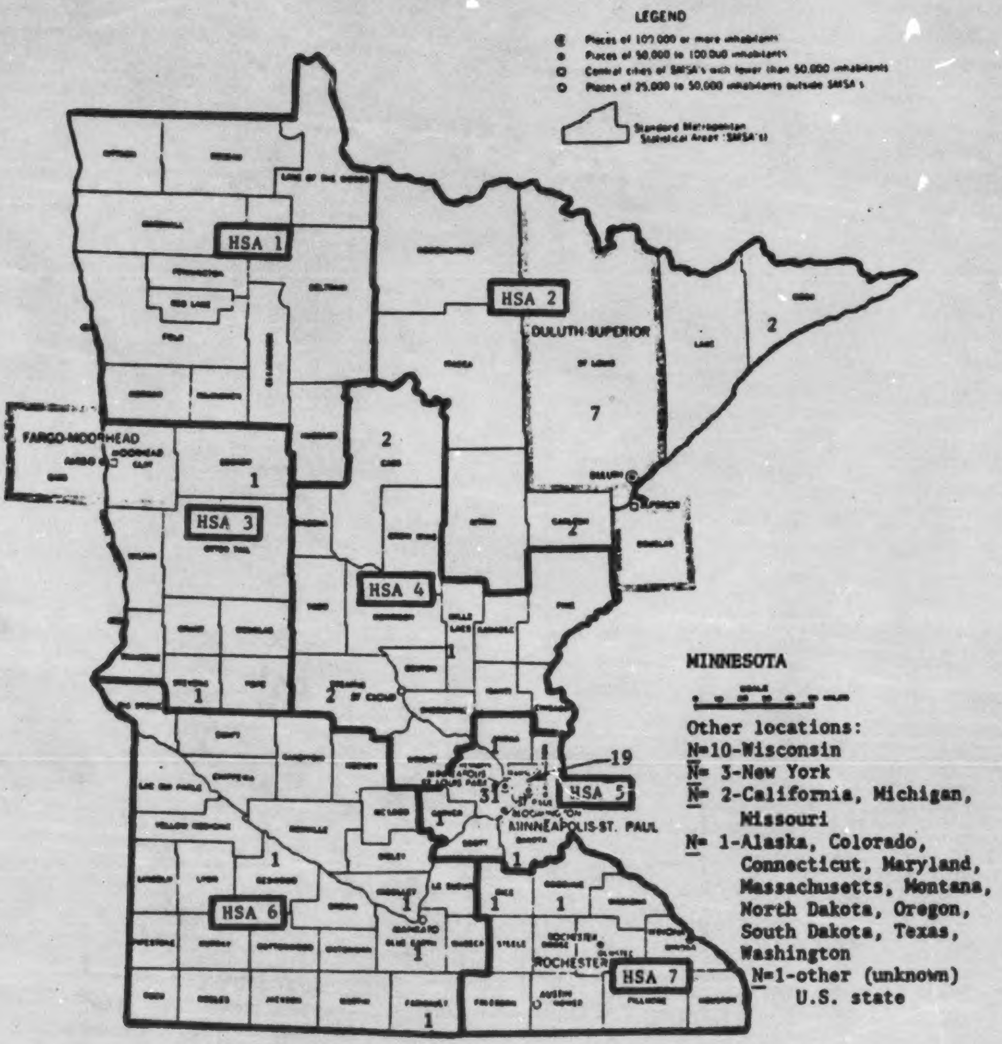
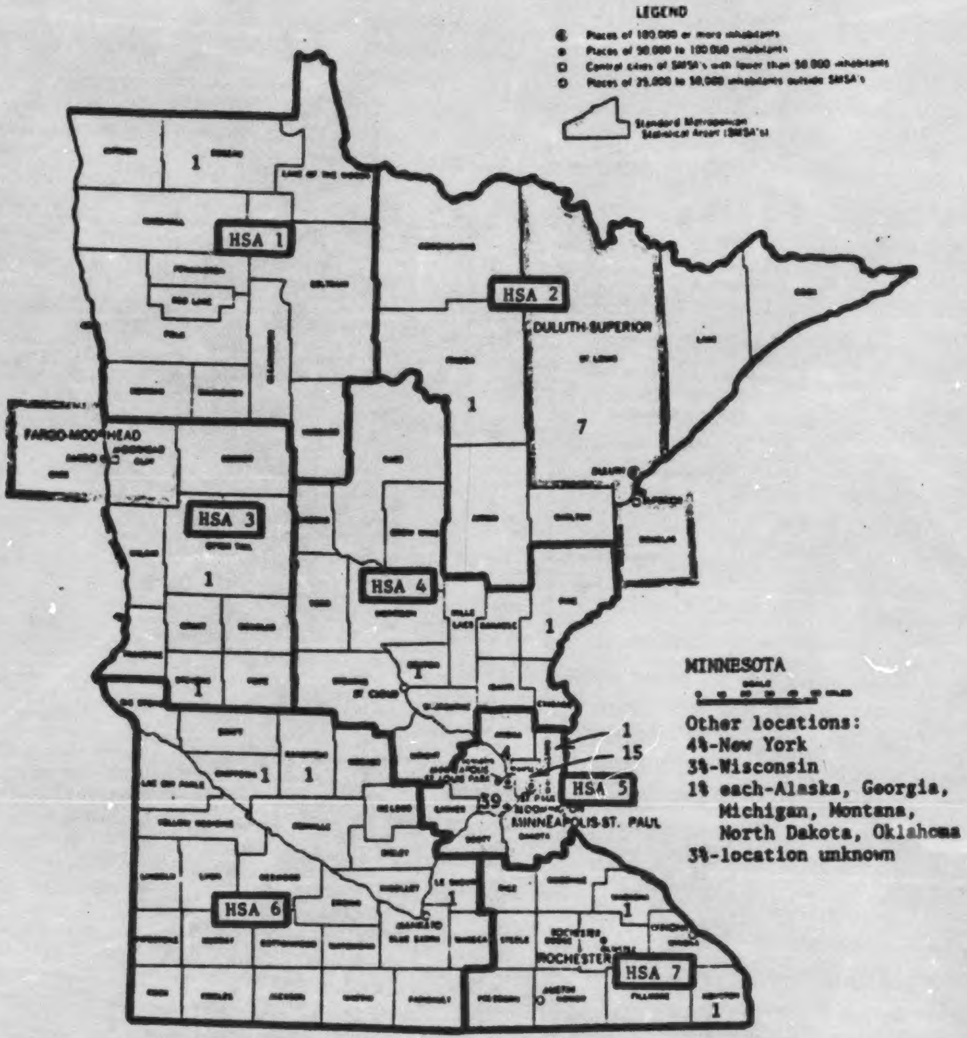
[1] It should be pointed out that this part of Minnesota is generally served by North Dakota's health professional Schools.


LEGEND
Places of 100,000 or more inhabitants
Places of 50,000 to 100,000 inhabitants
Central cities of SMSA's with fewer than 50,000 inhabitants
Places of 25,000 to 50,000 inhabitants outside SMSA's
Standard Metropolitan Statistical Areas (SMSA's)
HSA 1
HSA 2
HSA 3
HSA 4
HSA 5
HSA 6
HSA 7
DULUTH-SUPERIOR
FARGO-MOORHEAD
MINNEAPOLIS-ST. PAUL
ROCHESTER
St. Cloud
Mankato
7
2
2
1
2
1
2
1
1
31
19
1
1
1
1
1
1
1
1
1
MINNESOTA

Other locations:
N=10-Wisconsin
N= 3-New York
N= 2-California, Michigan, Missouri
N= 1-Alaska, Colorado, Connecticut, Maryland, Massachusetts, Montana, North Dakota, Oregon, South Dakota, Texas, Washington
N=1-other (unknown) U.S. state

Figure 3. Current professional location of 108 former medical students and residents participating in AHEC programs* who also are known to have completed residency training as of 1980. Since N is close to 100, percentages are not used. These 108 represent 22% of the total group of 488 former AHEC-involved medical students and residents. HSAs are Health Service Areas (only Minnesota portions of interstate HSAs are shown). (Map adapted from U.S. Bureau of Census, 1972, p. 25-501.)

*See footnote for Figure 2 on p. 33.


LEGEND
Places of 100,000 or more inhabitants
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Central cities of SMSA's with fewer than 50,000 inhabitants
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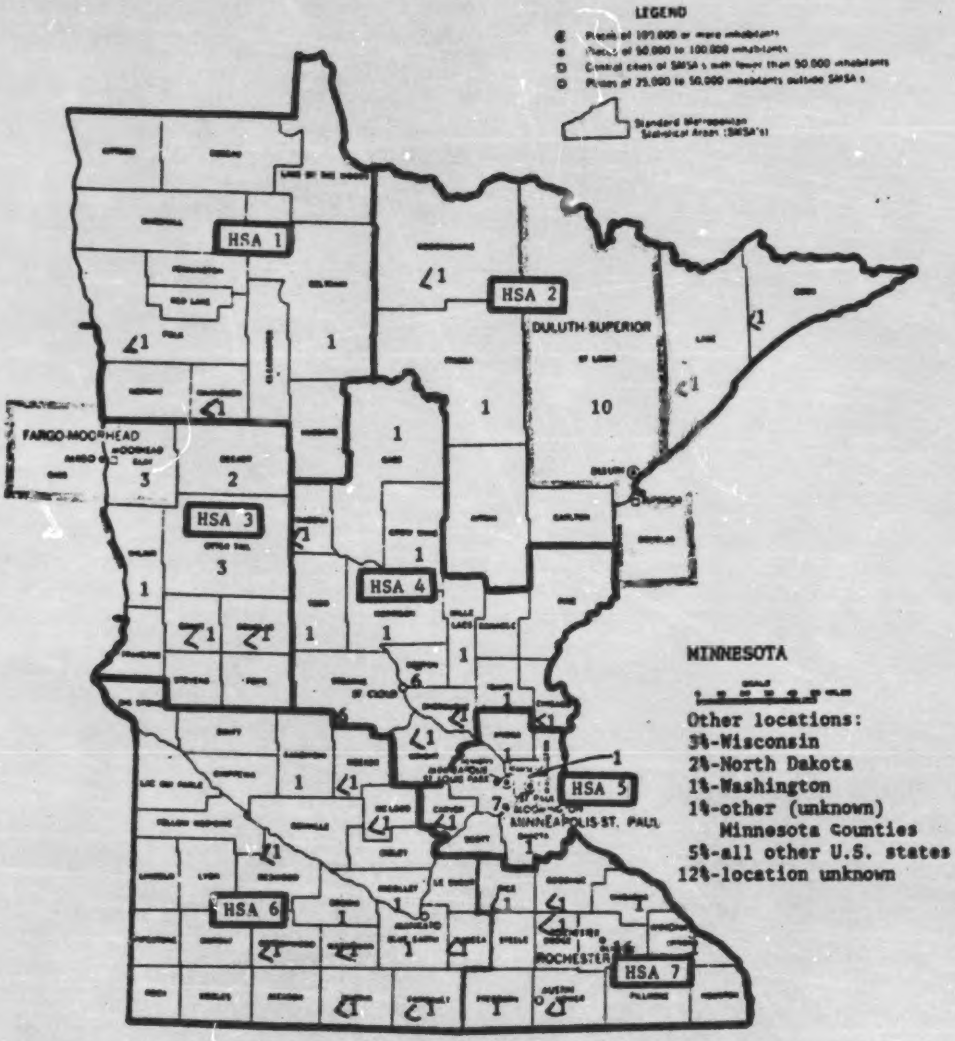
Standard Metropolitan Statistical Areas (SMSA's)
HSA 1
HSA 2
HSA 3
HSA 4
HSA 5
HSA 6
HSA 7
FARGO-MOORHEAD
DULUTH-SUPERIOR
MINNEAPOLIS-ST. PAUL
ROCHESTER
ST. CLOUD
MINNESOTA
1
1
1
7
1
1
1
1
1
1
1
15
39
1
1
1

Other locations:
4%-New York
3%-Wisconsin
1% each-Alaska, Georgia, Michigan, Montana, North Dakota, Oklahoma
3%-location unknown

Figure 4. Current professional location of the 72 former dental students participating in AHEC programs.* Number entries are percentages. HSAs are Health Service Areas (only Minnesota portions of interstate HSAs are shown). (Map adapted from U.S. Bureau of the Census, 1972, p. 25-501.)

*See footnote for Figure 2 on p. 33.



Other locations:
3%-Wisconsin
2%-North Dakota
1%-Washington
1%-other (unknown) Minnesota Counties
5%-all other U.S. states
12%-location unknown

Figure 5. Current professional location of the 347 former nursing students participating in AHEC programs.* Number entries are percentages. HSAs are Health Service Areas (only Minnesota portions of interstate HSAs are shown). (Map adapted from U.S. Bureau of the Census, 1972, p. 25-501)

*See footnote for Figure 2 on p. 33.

necessary because professional location was not found for 12% of registered nurses.)

For the remaining follow-up professional groups, proportions of two-thirds to about 90% of those with known addresses were located professionally in Minnesota, with proportions of about 30% to 75% of those with known addresses located in the Metropolitan HSA 5. Of those with known addresses, about half the dietetics group is currently located professionally in outstate Minnesota (outside HSA 5 and the Twin Cities); about one-fourth of each group--pharmacy, occupational therapy, and physical therapy--is located in outstate Minnesota; and about 15% of the dental hygiene and interdisciplinary (i.e., social work and human services) groups are located in outstate Minnesota (see Table 5).

Figure 2 shows that HSA 1 (Agassiz) and HSA 6 (Southwestern) are the areas of Minnesota least served by former AHEC participants now in practice. Eleven counties in HSA 6 and four in HSA 1 currently have no former AHEC participants. The only other Minnesota county with no AHEC-training professional is Traverse, in HSA 3 (Min-Dak).

Rural, outstate, and underserved areas of Minnesota. The implicit goal of the Minnesota AHEC Project, or any program seeking improved distribution of health professionals in Minnesota, is to encourage participants to practice professionally in "outstate" Minnesota; that is, outside HSA 5 and the Minneapolis-St. Paul SMSA.

During the 1970's, HSA 5 contained half of Minnesota's approximately four million people; and also contained proportions of somewhat over half (55-58%) of Minnesota's active, non-federal physicians, licensed dentists, and licensed registered nurses (see Higgins & Lawrenz, 1980).

One would also encourage practice outside Olmsted County in HSA 7

Table 5

Current Professional Location of Follow-up Groups of Former Participants in AHEC Programs: Percentages

Current professional location[a]	Medical students and residents						Dental students				Nursing students							Stdts. in soc. work, other fields, took interdisciplin. prog.			
	Medical students																				
	Phase B (N=36) %	Phase D (N=80) %	RPAP (N=227) %	Total (N=343) %	Res.[b] (N=122) %	Total, med. stdts res.[c] (N=488) %	Took urban rot. (N=27) %	Took rural rot. (N=45) %	Total (N=72) %	Dent. hyg. stdts. (N=185) %	Took non-UofM cses. (N=123) %	Took UofM cses. (N=224) %	Total (N=347) %	Pharm. stdts. (N=128) %	Diet. stdts. (N=51) %	Occ. ther. stdts. (N=44) %	Phy. ther. stdts. (N=70) %	Took urban rot. (N=29) %	Took out-state prog. (N=85) %	Total (N=114) %	Total, all AHEC participants (N=1,499) %
Minnesota, total	97	60	72	72	80	73	74	87	82	66	64	83	76	73	65	50	80	45	74	67	72
HSA 1: Agassiz	3	0	0	0[e]	0	0[e]	4	0	1	2	0	2	1	0	0	0	0	0	0	0	1
HSA 2: W. Lake Superior	6	4	5	5	13	7	7	9	8	3	1	17	11	8	12	2	6	0	2	2	7
St. Louis	6	4	4	4	11	6	7	7	7	3	1	15	10	5	10	2	6	0	2	2	6
HSA 3: Min-Dak	0	0	1	1	1	1	0	4	3	1	21	3	9	1	0	2	1	3	1	2	3
Becker	0	0	0	0	1	0[e]	0	0	0	0	7	0	2	0	0	0	0	3	0	1	1
Clay	0	0	0	0	0	0	0	0	0	0	5	2	3	0	0	0	0	0	0	0	1
Otter Tail	0	0	0	0	0	0	0	2	1	1	7	1	3	0	0	0	1	0	1	1	1
HSA 4: Central Minn.	0	0	2	1	3	2	0	4	3	3	23	17	19	6	16	9	7	0	7	5	8
Benton	0	0	0	0	0	0	0	2	1	0	3	8	6	1	0	2	0	0	1	1	2
Isanti	0	0	0	0	1	0[e]	0	0	0	1	2	0	1	0	0	2	3	0	2	2	1
Stearns	0	0	1	1	1	1	0	0	0	1	12	3	6	1	14	2	1	0	0	0	2
HSA 5: Metropolitan	89	54	60	62	58	60	59	60	60	53	15	10	12	46	24	34	56	34	62	55	44
Anoka	0	1	0	0[e]	0	0[e]	4	4	4	2	2	1	1	2	4	0	6	0	2	2	1
Dakota	0	0	0	0	2	0[e]	0	0	0	5	2	1	1	1	4	2	1	0	5	4	2
Hennepin	78	45	49	51	36	47	41	38	39	30	10	6	7	23	12	20	33	28	38	35	30
Ramsey	8	8	11	10	20	12	15	16	15	14	2	1	1	17	4	9	14	7	14	12	10
Washington	3	0	0	0[e]	0	0[e]	0	2	1	2	0	0	0	2	2	2	0	0	1	1	1
HSA 6: Southwestern[d]	0	0	0[e]	0[e]	3	1	4	4	4	2	3	5	5	5	6	0	1	7	0	2	3
HSA 7: Southeastern	0	3	3	2	2	2	0	4	3	3	1	29	19	7	8	2	9	0	1	1	7
Olmsted	0	1	2	2	0	1	0	0	0	0	0	24	16	4	2	2	0	0	1	1	5
Other U.S. states, total	3	40	28	28	20	27	22	11	15	17	9	13	12	23	24	2	19	24	11	14	19
California	0	5	2	2	1	2	0	0	0	2	0	0[e]	0[e]	2	4	0	3	3	0	1	1
Iowa	0	4	2	2	2	2	0	0	0	2	0	0[e]	0[e]	1	2	0	0	0	0	0	1
Michigan	0	4	3	3	2	3	0	2	1	1	0	0	0	2	0	0	3	0	1	1	1
New York	0	1	1	1	2	1	11	0	4	0	0	0	0	2	0	0	1	0	0	0	1
North Dakota	0	1	1	1	1	1	4	0	1	0	0	3	2	0	0	0	0	0	0	0	1
Wisconsin	0	8	6	6	5	5	4	2	3	8	0	4	3	2	2	0	0	0	2	2	4
Locations outside U.S.	0	0	0	0	0	0	0	0	0	2	0	0	0	2	2	2	0	0	0	0	1
Location not known	0	0	0[e]	0[e]	0	0[e]	4	2	3	15	27	4	12	2	10	45	1	31	15	19	8

Note. In the present table abbreviations are: res.=resident physician, stdts.=students, rot.=rotation, dent. hyg.=dental hygiene, cses.=courses, pharm.=pharmacy, diet.=dietetics, occ. ther.=occupational therapy, phy. ther.=physical therapy, prog.=program.

[a] Current professional location is based on the best available practice address, obtained from self-report or archival records. If the former participant was still in training or residency, professional location was the main training or residency site. Home address was used if practice or training address was not available. Only those locations having 10 or more former AHEC participants are listed separately in this table.

[b,c] See footnotes b and c for Table 3.

[d] Health Service Area (HSA) 6 has not been officially labeled; "Southwestern" is a reasonable mnemonic that will be used throughout this report.

[e] Less than 1%, but equal to, or greater than, N=1.

(Southeastern). Olmsted County contains Rochester, home of the Mayo Clinic.

The fact that about 40% of former AHEC participants now likely to be practicing professionally are located in HSA 5--this fact is not particularly surprising although one would hope for a lower percentage in future follow-up research, as the careers of these young, former AHEC participants develop. Some evidence presented later in this report suggests that for former AHEC-involved medical students and residents, at least, future follow-up studies would show some migration to outstate practice areas.

The Minnesota AHEC Project seeks, even beyond improved distribution of health professionals toward outstate areas, an improved distribution favoring rural areas. Generally, rural areas are more highly deprived of health care in Minnesota than are urban areas.

The term "rural" will be defined in this report as any area outside the Standard Metropolitan Statistical Areas (SMSAs) defined by the U.S. Bureau of the Census. An SMSA is a metropolitan area, defined as a county (or group of counties) containing a city (or twin cities) having 50,000 or more people.

Minnesota contained all or part of four SMSAs as of 1972: namely, the five-county Minneapolis-St. Paul area; Rochester (Olmsted County); Duluth-Superior (containing St. Louis County in Minnesota, plus a Wisconsin county); and Fargo-Moorhead (containing Clay County in Minnesota, plus a North Dakota county).

Presumably, the most highly deprived areas are the Minnesota counties designated by the U.S. Public Health Service, Bureau of Health Manpower, as Primary Medical Care Shortage Areas (1978a, 1978c). Most of these Minnesota counties represent rural areas, but Hennepin and Ramsey counties in HSA 5--containing Minneapolis and St. Paul--have been so designated because of the severe health care needs of their Indian American populations (see Table 6).

If one treats Hennepin and Ramsey counties as non-shortage areas, then Table 6 shows that about 5% of the 1,120 former AHEC participants now in professional practice are currently located in a county either partially or wholly designated as a federal Primary Medical Care Shortage Area.

Type of community in which former AHEC participants practice. Of the 1,120 former AHEC participants now believed to have completed their training, 58% now live in urban-area communities and 29% in rural-area communities--either inside or outside Minnesota.

Urban-area communities were classified into three types: main city portions of metropolitan (metro) areas; "inner" suburbs, just outside the main city portion of a metro area; and "outer" suburbs, which may be a town, small city, or even a rural area at the outskirts of a metro area. All urban-area communities were included within an SMSA.

Rural-area communities were classified into two types: non-metro area communities within 50 miles of a metro area (SMSA); and non-metro area communities 50 or more miles from a metro area.

Of the 108 former AHEC-involved medical students and residents known to have completed residency training, about 70% are now located in urban areas (two-thirds alone are located in the main city portions of metro areas); and about 30% in rural areas (16% in communities isolated from large SMSA cities by at least 50 miles).[2]

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[2] Note that these urban-rural comparisons include 7% of former participants with known addresses (who have completed all training) now living outside Minnesota.

Table 6

The Relationship in Minnesota Among Primary Medical Care Shortage Areas, Locations of AHEC Training, and Current Professional Locations of Former AHEC Participants

Minnesota county	Federal Shortage Area information				For former AHEC participants, comparisons of AHEC training location and current professional location	
	All or part of county designated as of 1978[a]	Population[b] per patient care physician,[c] 1977 N	Infant deaths per 1,000 live births, 1978[d] N	% below federal poverty level, 1970[e] %	Trained in county (N=1,580)[f] %	Practice in county (N=1,120)[g] %
HSA 1: Agassiz						
Beltrami	All	1,254	13.5	17.3	.7	.2
Clearwater		2,967	0.0	24.0	.1	.1
Hubbard		1,433	9.4	20.7	.4	.1
Kittson		2,300	22.2*	13.3	0.0	0.0
Lake of the Woods	All	1,400	12.5	16.1	0.0	0.0
Mahnomen		2,850	9.4	24.6	.1	.1
Marshall		4,467*	0.0	21.5	0.0	0.0
Norman		3,233	14.7	17.2	0.0	0.0
Pennington		750	12.1	9.0	.6	.1
Polk	Part	1,714	8.7	13.0	1.5	.1
Red Lake		5,300*	0.0	21.2	.2	.1
Roseau	All	2,540	24.5 *	14.9	.1	.2
HSA 2: W. Lake Superior						
Aitkin	Part	2,183	10.0	18.3	.5	.2
Carlton		1,547	10.3	8.6	.7	.3
Cook		1,050	0.0	8.3	.4	.3
Itasca		1,252	21.3*	12.7	.6	.5
Koochiching		1,760	31.6*	11.0	.3	.1
Lake		1,255	14.2	5.5	.2	.1
St. Louis		714	13.9	7.9	12.1	6.2
HSA 3: Min-Dak						
Becker		1,255	11.8	18.2	.1	.9
Clay	Part	2,963	12.6	7.8	4.2	.9
Douglas		988	9.3	14.7	.5	.1
Grant		3,800*	27.0*	17.3	.1	.1
Otter Tail		1,096	11.0	16.1	1.9	1.3
Pope		2,280	11.2	14.7	.4	.3
Stevens		2,825	5.6	13.1	0.0	.2
Traverse		3,050	25.6*	17.9	0.0	0.0
Wilkin	Part	1,483	0.0	13.4	0.0	.2
HSA 4: Central Minnesota						
Benton		3,257	12.0	10.6	1.1	2.3
Cass	All	6,867*	19.2	21.4	1.3	.4
Chisago		2,270	4.9	10.2	.1	.2
Crow Wing	Part	1,070	15.2	11.6	1.1	.7
Isanti		1,360	5.9	8.3	5.9	.8
Kanabec	Part	1,629	31.6*	13.6	.4	.1
Mille Lacs	Part	1,415	16.1	14.5	.6	.6
Morrison	Part	1,561	5.7	18.0	.9	.4
Pine	Part	6,333*	9.0	14.3	.1	.2
Sherburne		5,660*	13.3	7.5	0.0	.2
Stearns		992	8.5	12.3	10.2	3.1
Todd		2,667	11.4	24.5	.4	.3
Wadena		1,390	15.6	17.4	.6	.2
Wright		2,092	8.6	10.8	1.0	.2
HSA 5: Metropolitan						
Anoka		2,076	11.5	3.4	.1	1.9
Carver		1,239	10.3	7.1	.9	.3
Dakota		2,482	11.5	3.5	1.3	2.1
Hennepin	Part	391	11.8	4.7	21.5	22.2
Ramsey	Part	506	13.1	5.1	4.0	10.0
Scott		2,195	21.1*	7.7	.3	.3
Washington		2,511	9.6	4.0	.9	.9

(Table continued on next page)

Table 6 (continued)

Minnesota county	Federal Shortage Area information				For former AHEC participants, comparisons of AHEC training location and current professional location	
	All or part of county designated as of 1978[a]	Population[b] per patient care physician,[c] 1977 N	Infant deaths per 1,000 live births, 1978[d] N	% below federal poverty level, 1970[e] %	Trained in county (N=1,580)[f] %	Practice in county (N=1,120)[g] %
HSA 6: Southwestern						
Big Stone		1,520	10.5	15.6	.1	0.0
Blue Earth		779	13.9	7.8	1.3	.4
Brown		1,424	8.8	12.6	.9	.3
Chippewa		1,722	12.0	13.0	1.0	.2
Cottonwood	Part	2,171	17.0	11.7	.3	.1
Faribault		1,320	9.6	13.0	.7	.2
Jackson		2,417	9.7	12.4	.1	0.0
Kandiyohi		609	12.1	11.0	1.4	.5
Lac Qui Parle	Part	2,775	6.6	19.4	0.0	0.0
Le Sueur		1,375	2.7	10.2	.1	.3
Lincoln	Part	1,660	0.0	19.1	.1	0.0
Lyon		1,300	11.3	11.3	.4	0.0
McLeod		1,390	9.0	9.1	.4	.3
Martin		1,250	20.9*	9.7	.3	.2
Meeker		2,030	3.3	15.8	.2	.1
Murray		4,067*	15.6	14.9	.1	0.0
Nicollet		2,100	9.2	8.1	.4	.4
Nobles		1,041	5.6	11.4	.3	0.0
Pipestone	Part	1,967	5.2	17.0	.1	0.0
Redwood	All	3,940*	6.3	15.7	.2	.3
Renville		2,638	12.0	13.5	.1	0.0
Rock		1,600	6.0	10.7	.1	0.0
Sibley		3,950*	12.2	14.4	.1	.1
Swift		1,663	14.8	18.6	.3	.2
Waseca		2,022	3.0	9.6	0.0	.1
Watonwan		3,100	10.2	12.6	.1	.1
Yellow Medicine	Part	1,763	4.7	15.5	.3	0.0
HSA 7: Southeastern						
Dodge		3,425	4.0	11.8	0.0	.2
Fillmore		2,422	15.5	14.8	.3	.1
Freeborn		1,194	5.7	8.2	.1	.5
Goodhue		1,277	12.6	9.5	.8	.6
Houston		3,620*	3.8	10.3	0.0	.1
Mower		1,259	16.5	8.6	.4	.3
Olmsted		81	13.1	5.4	5.8	5.5
Rice		1,473	12.2	7.4	0.0	.3
Steele		1,257	16.3	7.6	.3	.2
Wabasha		1,454	25.8*	10.0	.1	.4
Winona		1,227	13.6	9.8	.9	.4
Minnesota, total		653	11.9	13.0	96.8	71.6

Note. HSAs are Health Service Areas (only Minnesota portions of interstate HSAs are shown).

[a] From U.S. Public Health Service, Bureau of Health Manpower (1978c).

[b] From Minnesota State Planning Agency, Office of the State Demographer (1979).

[c] From American Medical Association (1978).

[d] From Minnesota Department of Health (1979).

[e] From U.S. Bureau of the Census (1972).

[f] 1,580 represents the total of all AHEC training experiences for studied programs. Of these 1,580 experiences, 97% took place in Minnesota, 1% in Wisconsin, 1% in several locations in Minnesota (i.e., rotating dietetic traineeships); and for 2%, location was unknown.

[g] 1,120 represents the total of all former AHEC participants studied, less those medical students and resident physicians still in medical training. Hence, most of these 1,120 are practicing health professionals who have completed all their training. Of these 1,120, 4% are practicing in Wisconsin; 13% in other locations outside Minnesota; and for 11%, current professional location is unknown.

*Asterisk indicates a county statistic that exceeds a relevant federal criterion for designation of a primary medical care shortage area. Designation is not always automatic, however (Higgins & Lawrenz, 1980, pp. 31-36).

Of the 72 former AHEC dental students, about two-thirds are known to be in urban areas, and one-fourth in rural areas.[2]

The group of 347 former AHEC-involved nursing students whose addresses are known is currently almost evenly divided between urban and rural areas.[2]

Among other follow-up groups--and considering only participants with known addresses--the following proportions are currently located, and presumably practicing, in rural areas: over 40% of former dietetics students; about one-fourth of former dental hygiene, pharmacy, and occupational therapy students; and about one-fifth of former physical therapy students and students in social work or other human services fields.[2]

Table 7 presents a more detailed picture of current professional location; i.e., the proportions of each follow-up group now (as of 1979-1980) located professionally in various types of community. Again, for most former AHEC participants, the professional location is their practice location. But for 78% (380) former AHEC-involved medical students and resident physicians, their current professional location is their training (medical school or residency) location. Table 8 has therefore been prepared to show the type of practice community for those 108 former AHEC-involved medical students and residents who have completed their residency training.

Table 7 shows that for the total group of 1,499 former participants in AHEC prgrams, over half (54%) are currently located in the main city portion of a metropolitan area. Again, a metropolitan (metro) area is a Standard Metropolitan Statistical Area (SMSA), which is defined by the U.S. Bureau of the Census as counties containing a city--or twin cities--having 50,000 or more people.

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[2] Note that these urban-rural comparisons include the 7% of former participants with known addresses (who have completed all training) now living outside Minnesota.

Table 7
Current Professional Location of Former AHEC-Program Participants: Type of Community

Type of Community	Medical students and residents						Dental students				Nursing students							Stdts. in soc. work, other fields, took interdisciplin. prog.			
	Medical students																				
	Phase B (N=36) %	Phase D (N=80) %	RPAP (N=227) %	Total (N=343) %	Res.[b] (N=122) %	Total, med. stdts, res.[c] (N=488) %	Took urban rot. (N=27) %	Took rural rot. (N=45) %	Total (N=72) %	Dent. hyg. stdts. (N=185) %	Took non-UofM cses. (N=123) %	Took UofM cses. (N=224) %	Total (N=347) %	Pharm. stdts. (N=128) %	Diet. stdts. (N=51) %	Occ. ther. stdts. (N=44) %	Phy. ther. stdts (N=70) %	Took urban rot. (N=29) %	Took out-state prog. (N=85) %	Total (N=114) %	Total, all AHEC participants (N=1,499) %
Main city portion of a metropolitan (metro) area...	94	83	85	85	69	81	52	44	47	28	19	50	39	55	41	30	57	35	51	47	54
"Inner" suburb, just outside the main city portion of a metro area................	0	6	1	2	7	3	4	13	10	15	5	1	3	2	0	0	7	7	6	6	5
"Outer" suburb, which may be a town, small city, or even a rural area at the outskirts of a metro area.............	0	1	1	1	3	1	7	13	11	18	3	4	4	13	10	7	10	3	13	11	7
Non-metro area community within 50 mi. of a metro area..................	3	5	5	5	12	7	7	11	10	11	37	25	30	13	20	11	16	7	15	13	15
Non-metro area community 50 or more mi. from a metro area..................	3	5	8	7	8	7	15	16	15	11	8	13	12	13	18	2	1	14	0	4	9
Not known......................	0	0	0[e]	0[e]	1	0[e]	15	2	7	16	28	7	14	5	12	50	9	35	15	20	10

Note. A metropolitan (metro) area includes counties containing a city--or twin cities--having 50,000 or more people.

[b,c] See footnotes b and c for Table 3.

[e] Less than 1%, but equal to, or greater than, N=1.

Table 8

Current Professional Location of Former AHEC-Involved Medical Students and Residents Known to Have Completed Residency Training: Type of Community

Type of community	Medical students			Residents[b]	Total, medical students and residents[c]
	Phase D N=8	RPAP N=25	Total[d] N=35	N=71	N=108
Main city portion of a metropolitan (metro)area...	6	14	22	41	64
"Inner" suburb, just outside the main city portion of a metro area...............	0	0	0	6	6
"Outer" suburb, which may be a town, small city, or even a rural area at the outskirts of a metro area............	1	0	1	3	5
Non-metro area community within 50 mi. of a metro area.................	1	2	3	12	15
Non-metro area community 50 or more mi. from a metro area.................	0	9	9	8	17
Not known.....................	0	0	0	1	1

Note. See general note for Table 7.

[b,c] See footnotes b and c for Table 3.

[d] Includes 2 participants in the 1972-73 SAMA/MECO Preceptorship Program.

The proportions of the total group of 1,499 residing in other types of communities are as follows: 5% are located in "inner suburbs," just outside the main city portion of a metro area (but still within the SMSA or metro area); 7%, in "outer suburbs," which are towns, small cities, or even rural areas at the outskirts of (yet still within) a metro area (SMSA); 15%, in a non-metro area community within 50 miles (of the border) of a metro area; 9%, in a non-metro area 50 or more miles from a metro area.

Hence, two-thirds (66%) of the 1,499 are located in urban areas.

The remaining 10% of former participants could not be located.

Again, if one seeks an analysis of community type only for the 1,120 former participants now likely to be in practice, then one would remove from Table 7 statistics the 380 former AHEC-involved medical students and resident physicians who may still be in training.

When these 380 are removed, the proportion of the remaining 1,120 former AHEC participants--those presumably in practice--who live in rural communities increases to 29%, while the proportion who live in urban communities decreases to 58%.

Size of community in which former AHEC participants are now located professionally. Since often (but not always) smaller towns are located in rural areas, community size is highly correlated with community type (as defined previously). If one defines smaller communities as those under 25,000 and larger communities as those of 25,000 or more--than about one-third of all former AHEC participants believed to be currently practicing--with the exception of registered nurses and dental hygienists--are located in smaller communities (see Tables 9 and 10). About 40-45% of former AHEC-involved registered nurses and dental hygienists are apparently located professionally in smaller communities.

Table 9

Current Professional Location of Former AHEC-Program Participants: Size of Community

Size of community	Medical students and residents						Dental students				Nursing students							Stdts. in soc. work, other fields, took interdisciplin. prog.			
	Medical students																				
	Phase B (N=36) %	Phase D (N=80) %	RPAP (N=227) %	Total (N=343) %	Res.[b] (N=122) %	Total, med. stdts. res.[c] (N=488) %	Took urban rot. (N=27) %	Took rural rot. (N=45) %	Total (N=72) %	Dent. hyg. stdts. (N=185) %	Took non-UofM cses. (N=123) %	Took UofM cses. (N=224) %	Total (N=347) %	Pharm. stdts. (N=128) %	Diet. stdts. (N=51) %	Occ. ther. stdts. (N=44) %	Phy. ther. stdts. (N=70) %	Took urban rot. (N=29) %	Took out-state prog. (N=85) %	Total (N=114) %	Total, all AHEC participants (N=1,499) %
500,000 or more people......	0	13	4	6	2	5	0	0	0	1	0	1	1	4	4	0	0	7	1	3	3
At least 200,000 but less than 500,000.........	86	54	62	63	49	59	44	38	40	22	7	7	7	39	16	25	49	28	40	37	35
At least 100,000 but less than 200,000.........	0	6	5	5	2	5	0	0	0	1	1	1	1	2	4	0	1	0	4	3	2
At least 50,000 but less than 100,000.........	8	9	12	11	15	12	7	9	8	6	6	38	27	9	16	5	9	0	4	3	13
At least 25,000 but less than 50,000..........	0	10	4	5	11	7	7	13	11	15	20	15	17	9	22	5	4	3	13	11	11
At least 10,000 but less than 25,000..........	0	4	4	3	7	4	7	7	7	18	6	8	7	13	20	0	14	10	11	11	9
At least 2,500 but less than 10,000..........	3	3	4	3	9	5	19	18	18	14	17	9	12	12	6	14	6	7	7	7	9
Under 2,500 people..........	3	3	4	3	5	4	0	13	8	6	15	15	15	7	2	2	9	10	6	7	8
Not known....................	0	0	0	0	1	0	15	2	7	17	28	6	14	5	12	50	9	34	15	20	10

Note. Percentages may not total 100, due to rounding.

[b,c] See footnotes b and c for Table 3.

Table 10

Current Professional Location of Former AHEC-Involved Medical Students and Residents Known to Have Completed Residency Training: Size of Community

Size of community	Medical students Phase D N=8	 RPAP N=25	 Total[d] N=35	Residents[b] N=71	Total, medical students and residents[c] N=108
500,000 or more people...	2	0	2	2	5
At least 200,000 but less than 500,000.....	3	12	17	27	44
At least 100,000 but less than 200,000.....	0	0	0	2	2
At least 50,000 but less than 100,000.....	1	1	2	9	11
At least 25,000 but less than 50,000......	0	3	3	9	13
At least 10,000 but less than 25,000......	2	1	3	7	10
At least 2,500 but less than 10,000......	0	5	5	8	13
Under 2,500 people.......	0	3	3	6	9
Not known...............	0	0	0	1	1

Note. See general note for Table 9.

[b,c] See footnotes b and c for Table 3.

[d] Includes 2 participants in the 1972-73 SAMA/MECO Preceptorship Program.

The Intended Future Practice Locations of Former AHEC-Involved Medical Students and Resident Physicians

As described in the Methods section, a questionnaire survey was used to gather evaluative data from former AHEC-involved medical students and residents. Some of these data included respondents' conceptions of an ideal practice situation for themselves in 5-10 years, after they had completed all training and any medical service obligations (for example, required military medical service, National Health Service Corps work, or medical service to obtain loan forgiveness).

Of the 469 former AHEC-involved medical students and residents who were mailed a questionnaire, 83% returned their questionnaire at least partially completed. Again, these persons are called respondents.

Surveyed participants were asked to "Indicate the type of community in which you hope to practice in 5-10 years." Nearly two-thirds (64%) of respondents indicated they would choose ideally to practice in a rural, non-metro area (see Table 11). This proportion of former AHEC-involved medical students and residents who would like to settle in rural areas greatly exceeds the approximately 15% of these same persons who are now in rural areas. Even among the 108 residency completers responding to the survey, only 30% are currently in rural locations.

Also encouraging, in view of Minnesota AHEC Project goals, is the fact that two-thirds (66%) of these respondents prefer Minnesota as an ideal state for their practice location. Only 17% clearly prefer another state. At present, 15% are undecided.

In short, one might expect a substantial migration of these former AHEC-involved medical students and residents to rural practice locations in 5-10 years--if these respondents have incentives and personal circumstances that enable them to choose freely their own ideal practice location.

Table 11

Ideal Type of Practice Location in 5-10 Years as Reported by Former Medical Students and Resident Physicians Participating in AHEC Programs

Type of community	Medical students										Resident physicians		Total, medical students and residents		
	Phase B[a]	Phase D			RPAP			Total							
	(N=32)	74-77 grads (N=13)	78-81 grads (N=55)	Total[b] (N=69)	74-77 grads (N=42)	78-81 grads (N=134)	Total[b] (N=178)	74-77 grads (N=57)	78-81 grads (N=214)	Total[b] (N=279)	74-77 grads (N= 8)	Total[c] (N=95)	74-77 grads (N=66)	78-81 grads (N=223)	Total[b,c,d] (N=387)
	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%
Main city portion of a metropolitan (metro) area.......	3	31	13	16	26	4	9	26	6	10	13	18	26	6	12
"Inner" suburb, just outside the main city portion of a metro area..............................	0	8	2	3	2	2	2	4	2	2	13	15	5	2	5
"Outer" suburb, which may be a town, small city, or even a rural area at the outskirts of a metro area..................	13	8	16	15	14	7	8	12	10	10	38	15	15	10	11
Non-metro area community within 50 mi. of a metro area..........	31	8	29	25	21	28	26	19	29	27	0	19	17	28	24
Non-metro area community 50 or more mi. from a metro area......	47	31	31	32	33	53	48	32	47	44	13	31	29	46	40
Other. Please specify:............	0	8	2	3	2	2	2	4	2	2	0	0	3	2	2
Don't know.........................	6	8	7	7	0	5	3	4	5	5	13	2	5	5	4
No answer..........................	0	0	0	0	0	0	0	0	0	0	13	1	2	0[e]	1

Note. Respondents answered a number of questions so as to describe an ideal practice situation for themselves in 5-10 years, after they had finished their professional training and any required medical service obligations. "Ideal practice situation" was defined as "a combination of professional activities, practice arrangement or work conditions, and practice location that would be ideal for you." The group *N*'s, upon which column percentages are based, represent respondents; that is, persons who returned a questionnaire at least partially completed.

[a] All but 2 members of the Phase B group are in a 1981-82 graduation class group. The 2 exceptions were Phase B participants in the SAHA/MECO Preceptorship Program in 1972-73.

[b] Total includes University of Minnesota (U of M) medical students whose year of graduation was not known.

[c] Total includes resident physicians whose year of graduation was not known (many did not graduate in undergraduate medicine from the U of M, but came to Minnesota from other schools) plus one resident physician who graduated from the U of M Medical School in 1978.

[d] Total includes an additional 23 former medical students and residents participating in AHEC-supported interdisciplinary programs.

[e] Less than 1%, but greater than, or equal to, *N*=1.

Nearly half of the RPAP and Phase B groups, and nearly one-third of the Phase D and resident physician groups, indicated a preference for the most rural category; namely, a non-metro area community 50 or more miles from a metro area.

Clearly, the AHEC-involved former medical students and residents are, as a group, oriented toward practicing medicine in rural areas.

Table 12 shows, in addition, that these respondents also desire to practice in communities of smaller population. Over half (54%) indicated a preference for communities of less than 25,000; with 30% specifying the range of 2,500 to 10,000 as ideal for a practice location.

Also encouraging, in view of Minnesota AHEC Project goals, is the fact that two-thirds (66%) of these respondents prefer Minnesota as an ideal state for their practice location (see Table 13). Only 17% clearly prefer another state. At present, 15% are undecided.

Impact of the Minnesota AHEC Project on the Practice Location Intentions of Former AHEC-Involved Medical Students and Resident Physicians

As part of the survey, respondents were asked to rate the importance of up to two AHEC-sponsored preceptorships or rotations "in helping you decide what would be an ideal type of practice location for you."

Nearly three-fourths (72%) of the 445 rotations taken by 387 survey respondents were rated as either "very" or "somewhat" important in helping decide what would be an ideal type of practice location for them (see Table 14).

Rotations taken during the third or fourth year of Medical School--namely, Phase D and RPAP preceptorships--were rated as more important in deciding upon an ideal practice location than rotations taken earlier

Table 12

Ideal Size of Practice Location in 5-10 Years as Reported by Former Medical Students and Resident Physicians Participating in AHEC Programs

Size of Community	Medical students										Resident physicians		Total, medical students and residents		
	Phase B[a]	Phase D			RPAP			Total							
	(N=32)	74-77 grads (N=13)	78-81 grads (N=55)	Total[b] (N=69)	74-77 grads (N=42)	78-81 grads (N=134)	Total[b] (N=178)	74-77 grads (N=57)	78-81 grads (N=214)	Total[b] (N=279)	74-77 grads (N= 8)	Total[c] (N=95)	74-77 grads (N=66)	78-81 grads (N=223)	Total[b,c,d] (N=387)
	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%
500,000 or more people	0	31	11	15	7	5	5	12	6	7	13	11	14	5	8
At least 200,000 but less than 500,000	3	0	4	3	5	2	2	4	2	3	38	16	8	3	6
At least 100,000 but less than 200,000	3	0	0	0	5	1	2	4	1	1	13	11	5	1	4
At least 50,000 but less than 100,000	6	15	11	12	19	3	7	18	6	8	0	12	15	6	9
At least 25,000 but less than 50,000	22	15	11	12	12	10	10	14	12	12	0	8	12	12	11
At least 10,000 but less than 25,000	19	23	20	20	12	28	24	14	25	23	0	10	12	25	19
At least 2,500 but less than 10,000	38	8	29	26	21	38	34	18	36	33	13	21	17	35	30
Under 2,500 people	3	0	6	4	10	8	8	7	7	7	0	3	6	6	5
Don't know	6	8	9	9	7	7	7	9	7	7	13	8	9	7	8
No answer	0	0	0	0	2	0	1	2	0	0[e]	13	1	3	0[e]	1

Note. See general note for Table 11. The responses in this table were to the item, "Indicate the size of the community in which you hope to practice in 5-10 years."

[a,b,c,d] See footnotes a, b, c, and d for Table 11.

[e] Less than 1%, but greater than, or equal to, N=1.

Table 13

Ideal Geographic Area for Practice Location in 5-10 years as Reported by Former Medical Students and Reisdent Physcians Participating in AHEC Programs

Area	Medical students										Resident physicians		Total, medical students and residents		
	Phase B[a]	Phase D			RPAP			Total							
	(N=32) %	74-77 grads (N=13) %	78-81 grads (N=55) %	Total[b] (N=69) %	74-77 grads (N=42) %	78-81 grads (N=134) %	Total[b] (N=178) %	74-77 grads (N=57) %	78-81 grads (N=214) %	Total[b] (N=279) %	74-77 grads (N= 8) %	Total[c] (N=95) %	74-77 grads (N=66) %	78-81 grads (N=223) %	Total[b,c,d] (N=387) %
Minnesota	69	54	64	62	57	74	70	56	72	68	88	62	59	71	66
Another U.S. state. Please specify[f]	6	23	11	13	24	11	14	23	10	13	0	28	21	11	17
An area outside the U.S. Please specify[g]	0	0	2	1	0	0	1	0	1	1	0	1	0	0[e]	1
Don't know	25	23	24	23	14	15	15	18	18	18	0	7	15	17	15
No answer	0	0	0	0	5	0	1	4	0	1	13	1	5	0[e]	1

Note. See general note for Table 11. The responses in this table were to the item, "Indicate the geographic area in which you hope to practice in 5-10 years."

[a,b,c,d] See footnotes a, b, c, and d for Table 11.

[e] Less than 1%, but greater than, or equal to, N=1.

[f] Among the respondents who specified another state, the most frequent states were Wisconsin (4% of total group of 387), Montana (2%), Michigan (1%), and Washington (1%). A total of 17 different states were specified. Among respondents checking "another U.S. state," 19 (5% of total group) actually specified a U.S. region, with the most popular regions being the Rocky Mountain States (1%) and the Upper Midwest (1%).

[g] Specified areas outside the U.S. were Africa, Asia, and Australia-New Zealand (1 respondent each).

Table 14

Importance of AHEC - Sponsored Rotation in Choice of Practice Location: Ratings of Former Medical Students and Resident Physicians

Rating	Medical students										Resident physicians	Total, medical students and residents		
	Phase E[a]	Phase D			RPAP			Total						
		74-77 grads	78-81 grads	Total[b]	74-77 grads	78-81 grads	Total[b]	74-77 grads	78-81 grads	Total[b]	Total	74-77 grads	78-81 grads	Total[b,c,d]
	(N=32)	(N= 9)	(N=41)	(N=51)	(N=29)	(N=125)	(N=154)	(N=40)	(N=189)	(N=237)	(N=77)	(N=78)	(N=249)	(N=445)
	%	%	%	%	%	%	%	%	%	%	%	%	%	%
Very important	13	11	32	29	41	64	60	33	50	47	22	28	45	36
Somewhat important	16	78	51	55	35	29	29	43	31	33	34	44	34	36
Slightly important	34	0	10	8	21	5	8	20	10	11	17	17	11	13
Not at all important	31	0	5	4	3	2	3	3	8	7	23	10	8	13
Don't know how important	0	0	0	0	0	0	0	0	0	0	1	0	1	1
No answer	6	11	2	4	0	0	0	3	2	2	3	1	1	1

Note. To simplify interpretation of rotation ratings, all entries in this table--except for those in the last 3 columns --represent responses of medical students or residents who completed just 1 AHEC-sponsored rotation. See footnote f. Only questionnaire respondents--that is, persons who returned a questionnaire at least partially completed--are represented in this table.

This table is based on the question, "How important was this rotation in helping you decide what would be an ideal type of practice location for you?"

[a] All but 2 members of the Phase E group are in a 1981-82 graduation class group. The 2 exceptions were Phase B participants in the SAMA/MECO Preceptorship Program in 1972-73.

[b] Total includes University of Minnesota (U of M) medical students (or rotation ratings made by these students) whose year of graduation was not known.

[c] Total includes ratings of rotations taken by resident physicians whose year of graduation was not known (many did not graduate in undergraduate medicine from the U of M, but came to Minnesota from other schools).

[d] Total includes ratings of rotations taken by 23 former medical students and residents participating in AHEC-supported interdisciplinary programs.

[f] N's in these last 3 columns represent the number of ratings made by all respondents to all rotations. For example, if a respondent had two AHEC-supported rotations, and rated both rotations using the above question, then both ratings are included here. Hence, in the last 3 columns--and only in those columns--58 respondents are counted twice (a maximum of 2 rotations could be rated).

(i.e., Phase B Preceptorships) or later (i.e., during residency training). Perhaps Phase D is a crucial formative period for career decisions of medical students; e.g., concerning the type of practice location they would most prefer.

While self-reported ratings suggest that AHEC experiences are important in practice location decisions, some might argue that other factors are more important.

Type of hometown is one factor that might influence decisions concerning practice location. Perhaps physicians simply seek a practice location that represents the same type of community as their hometown.

Table 15 suggests that type of hometown is an important determinant of intended practice location--30% of respondents intend to practice in the same type of community as that in which they spent the greatest number of years before entering medical school. But type of hometown is not the only determinant of chosen type of ideal practice location-particularly for those 50% of respondents raised in urban settings (outer and inner suburbs, and cities within SMSAs). While 75% of those raised in rural, non-metro communities selected rural communities as their preferred type of practice location, only about 40% of those raised in urban areas preferred urban areas as practice locations.

In short, 55%-75% of the respondents representing each hometown type preferred rural areas as ideal practice locations. The most popular single type of ideal practice location, chosen by 40% of respondents, was also the most rural alternative offered, a "non-metro area community 50 or more miles from a metro area."

Table 15

Ideal Type of Practice Location in 5-10 Years for Former Medical Students and Residents from Different Types of Hometown

Ideal type of practice location	Type of hometown: Non-metro community 50 or more mi. from metro area (N = 102) %	Non-metro community within 50 mi. of metro area (N = 88) %	"Outer" suburb (N = 33) %	"Inner" suburb (N = 36) %	Main city portion of metro area (N = 117) %	Total (N = 376) %
Main city portion of a metropolitan (metro area)......	8	13	18	14	15	13
"Inner" suburb, just outside the main city portion of metro area..........................	4	2	3	8	9	5
"Outer" suburb, which may be a town, small city, or even a rural area at the outskirts of a metro area................	8	9	12	22	14	12
Non-metro area community within 50 mi. of a metro area.........	20	34	15	25	24	25
Non-metro area community 50 or more mi. from a metro area.....................	55	40	46	28	31	40
Other. Please specify:...........	2	0	3	0	3	2
Don't know.......................	4	2	3	3	5	4

Note. Entries in this table are based on 376 former medical students and residents participating in AHEC programs for whom hometown information was available, and who also answered the question, "Indicate the type of community in which you hope to practice in 5-10 years." Such information was missing for 18 former participants. For most former participants hometown information was obtained from the questionnaire item, "Before you entered medical school, what town or city did you live in for the greatest number of years?" For remaining participants' hometown data were obtained from U. of M. Medical School graduation lists.

The dependence between type of hometown and ideal type of practice location ("other" and "don't know" categories omitted) met conventional levels of statistical significance: Chi square =29.0, df = 16, p = .02.

An open-ended item on the survey questionnaire invited respondents to "use the space below for any comments you may wish to make concerning the quality of this rotation, or its influence on your choice of specialty or practice location." A number of respondents volunteered written comments suggesting the AHEC-sponsored rotations had influenced their choice of a future practice location. Content analysis of these written comments resulted in categories including the following: rotation provided practical knowledge of rural medicine or rural life (written by 5% of respondents); intend to practice in the same or similar location or practice situation, or with the same physician (4%); enjoyed rotation or location (4%); and influenced or clarified choice of a practice location (2%). In some cases (2% of volunteered comments), the AHEC rotation influenced choice of practice location away from a rural area.

In short, while demographic characteristics--such as hometown--were related to respondents' choice of an ideal practice location, participation in an AHEC-supported clinical rotation (usually in a rural or outstate area) seems to have made an important, independent contribution to respondents' choice of an ideal practice location.

As discussed earlier, the AHEC objective of improved geographic distribution of health professionals may well be met among these 376 former AHEC-involved medical students and residents responding to the survey. Nearly two-thirds (65%) hope to practice in a rural community in 5-10 years, after completing their training and any required medical service obligations.

2. What Was the Minnesota AHEC Project's Contribution to Improved Supplies of Primary Care Physicians?

The main health professional supply and distribution goal of the national AHEC effort and of the Minnesota AHEC Project is to improve the numbers and dispersion of primary care health professionals. The term "primary care," used here and elsewhere in this report, refers to the patient's initial medical service in the health care delivery system, and those medical services that are performed on an ongoing basis by those health professionals who maintain primary responsibility for the patient's general health. Primary care health professionals perform a wide range of health care services, but may refer their patients for specialized health care services to other health care professionals or specialists.

Primary care health professionals include physicians in the specialties of family practice, general internal medicine, general pediatrics, and obstetrics and gynecology; physician's assistants; and nurse practitioners. These categories of primary health care professionals are those listed in the interim-final regulations for AHEC programs (U.S. Public Health Service, Bureau of Health Manpower, 1978b) and in recent requests for Minnesota AHEC proposals (RFPs), sent by the Health Resources Administration (e.g., HRA 232-DM-0004 (0), June 25, 1979).

Current Specialty Choice of Former AHEC-Involved Medical Students and Resident Physicians

Three-fourths or more of nearly every follow-up group of former AHEC-involved medical students have indicated--either via the AHEC survey or via records of medical associations--their decision to practice a primary care specialty. Half or more of every follow-up group have chosen the specialty of family or general practice (see Table 16).

For the entire group of 488 former AHEC-involved medical students and residents, 81% have chosen a primary care specialty. Specifically, 58% have chosen family or general practice; 17%, internal medicine; 5%, pediatrics; and 1%, obstetrics and gynecology.

About one-fifth (22%) of the Phase B (second year) medical student follow-up groups were still undecided about specialty choice as of mid-1980.

No other specialties were chosen by more than 2-3% (10 to 15 persons) in the total group of 488. Such specialties chosen by a small minority of former AHEC participants included general surgery (chosen by 3%), psychiatry or child psychiatry (2%), medical specialties (2%), and surgical specialties (2%).

Comparing Current Specialty Choice of AHEC-Involved vs. Non-AHEC U of M Medical School Graduates

In order to determine whether AHEC-involved U of M Medical School students differed from their non-AHEC peers in choice of a specialty, a comparison group or "control group" of 200 non-AHEC medical students was studied. This non-AHEC group constituted a stratified random sample of 1976-79 Medical School graduates who did not participate in AHEC programs.

From each Medical School class--for the four years, 1976-79--a sample of 50 students was chosen so as to fairly represent the entire group of 200-230 non-AHEC students within that class. For each class, both the non-AHEC sample and the entire non-AHEC class membership had the

Current Specialty Choice of Former Medical Students and Resident Physicians Participating in AHEC Programs

Specialty choice	Medical students										Resident physicians		Total, medical students and residents		
	Phase B[a]	Phase D			RPAP			Total							
		74-77 grads	78-81 grads	Total[b]	74-77 grads	78-81 grads	Total[b]	74-77 grads	78-81 grads	Total[b]	74-77 grads	Total[c]	74-77 grads	78-81 grads	Total[b,c,d]
	(N=36)	(N=15)	(N=64)	(N=80)	(N=70)	(N=147)	(N=226)	(N=87)	(N=240)	(N=342)	(N=11)	(N=122)	(N=103)	(N=253)	(N=488)
	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%
Family or general practice	50	53	64	63	61	64	61	59	63	60	55	54	56	64	58
General internal medicine	17	20	13	14	16	18	18	17	16	17	27	21	18	15	17
Pediatrics	0	0	2	1	4	1	2	3	1	2	0	12	4	1	5
Obstetrics and gynecology	0	0	3	3	0	1	1	0	2	1	9	3	1	2	1
General surgery	3	13	3	5	7	3	4	8	3	4	0	0	7	2	3
Psychiatry or child psychiatry	0	7	0	1	1	3	2	2	2	2	0	1	5	2	2
Medical specialties (e.g., allergy, cardiology, dermatology, gastroenterology, pulmonary diseases, etc.)	0	0	3	3	0	1	0[e]	0	1	1	0	5	0	1	2
Surgical specialties (e.g., opthalmology, otolaryngology, urology, etc.)	3	0	2	1	6	1	3	5	1	2	0	0	4	1	2
Emergency medicine	0	7	0	1	1	0	0[e]	2	0	1	0	3	2	0	1
Pathology	3	0	3	3	0	1	0[e]	0	2	1	0	0	0	2	1
Radiology	0	0	2	1	3	1	1	2	1	1	0	1	2	1	1
Other specialties (e.g., anesthesiology, neurology, preventive medicine, research)	3	0	2	1	0	2	1	1	2	2	9	2	2	2	2
Undecided or specialty not yet chosen (e.g., "flexible" residency, etc.)	0	0	5	4	0	5	5	0	4	4	0	0	0	4	3
No information on specialty choice	22	0	0	0	0	0	0[e]	0	3	3	0	0	0	3	2

Note. Current specialty choice was obtained directly from respondents' questionnaire data. For those persons not completing a questionnaire, a variety of archival sources were used, including the 1979 directory of the Minnesota Medical Association, the 1979 directory of the American Medical Association, and information maintained by University of Minnesota departments and programs.

[a,b,c,d] See footnotes a, b, c, and d for Table 11.

[e] Less than 1%, but greater than, or equal to, N=1.

same distribution (a) of men vs. women (about 80% vs. 20%); (b) of students choosing family practice vs. other primary care specialties vs. all other specialties; (c) of hometown addresses (as of graduation) in the Twin Cities vs. outstate Minnesota vs. outside Minnesota; (d) of students selecting residency programs in Minnesota vs. outside Minnesota. Information needed to stratify the non-AHEC random sample was obtained from Medical School graduation lists.

Table 17 compares the specialty choices of these non-AHEC graduates with AHEC-involved graduates from the same classes.

Surprisingly, the total proportions of AHEC vs. non-AHEC graduates who have apparently chosen primary care specialties (family or general practice, internal medicine, pediatrics, and obstetrics and gynecology) were nearly identical (83% vs. 85%, respectively). The AHEC graduates, however, were about three times more likely than the non-AHEC graduates to have chosen family or general practice (62% vs. 23%, respectively). The non-AHEC graduates were twice as likely as the AHEC graduates to have chosen internal medicine (38% vs. 18%). About one-fifth (22%) of the non-AHEC group had chosen pediatrics, compared to only 2% of the AHEC group.

Despite the equal proportions of AHEC and non-AHEC graduates who have chosen one of the primary care specialties--the AHEC group, in general, is probably more oriented toward primary care. Some of the 60% of non-AHEC graduates who have chosen internal medicine or pediatrics are likely practicing, or preparing to practice, a subspecialty within those two general fields. Choice of family or general practice, however, represents a clearer commitment to primary care.

Table 17

Current Specialty Choice of AHEC and non-AHEC U of M Medical School Graduates, Classes of 1976-79

Specialty choice	Classes of 1976, 1977				Classes of 1978, 1979				Combined classes, 1976-79			
	AHEC participants			Non-AHEC sample	AHEC participants			Non-AHEC sample	AHEC participants			Non-AHEC sample
	Phase D (N= 15) %	RPAP (N= 70) %	Total (N= 85) %	(N= 97) %	Phase D (N= 55) %	RPAP (N=112) %	Total (N=167) %	(N= 99) %	Phase D (N= 71) %	RPAP (N=186) %	Total (N=257) %	(N=200) %
Family or general practice	53	61	60	22	62	63	63	22	61	62	62	23
Internal medicine	20	16	17	32	13	21	18	46	14	19	18	38
Pediatrics	0	4	4	17	2	1	1	27	1	2	2	22
Obstetrics and gynecology	0	0	0	3	2	2	2	0	1	1	1	2
General surgery	13	7	8	7	4	3	3	3	6	4	5	5
Psychiatry or child psychiatry	7	1	2	5	0	3	2	0	1	2	2	3
Medical specialties (e.g., allergy, cardiology, dermatology, gastroenterology, pulmonary diseases, etc.)	0	0	0	1	4	1	2	1	3	1	1	2
Surgical specialties (e.g., opthalmology, otolaryngology, urology, etc.)	0	6	5	2	2	2	2	0	1	3	3	1
Emergency medicine	7	1	2	2	0	0	0	0	1	1	1	1
Pathology	0	0	0	2	4	1	2	0	3	1	1	1
Radiology	0	3	2	3	2	1	1	1	1	2	2	2
Other specialties (e.g., anesthesiology, neurology, preventive medicine, research)	0	0	0	4	2	3	2	0	1	2	2	2
Undecided or specialty not yet chosen (e.g., "flexible" residency, etc.)	0	0	0	0	6	1	2	0	4	1	2	0
No information on specialty choice	0	0	0	0	0	0	0	0	0	1	0*	1

Note. In this table and related tables U of M medical students participating in two major AHEC-supported programs (AHEC participants) are compared with a stratified random sample of U of M medical students (the non-AHEC sample) not participating in either of the same programs. The two AHEC programs were the RPAP Program and the Phase D Preceptorship Program (family practice, medicine, or other primary care rotations only). The Medical School classes selected were those of 1976, 1977, 1978, and 1979. The non-AHEC sample was randomly selected from all non-AHEC students, as defined above, but stratified so as to represent each class in terms of specialty (residency) choice as of graduation, hometown location (Twin Cities vs. outstate Minnesota vs. outside Minnesota), and sex. Some members of the non-AHEC sample participated in AHEC supported programs subsequently as resident physicians; also, some may have participated in AHEC undergraduate medical programs (e.g., interdisciplinary rotations) other than RPAP or Phase D medical rotations.

Data on specialty choice were generally obtained from different sources for AHEC participants vs. the non-AHEC sample. Current self-report data on specialty choice were available for AHEC participants who completed a follow-up questionnaire. Since the non-AHEC sample was not surveyed, specialty choice data for this group came from U of M Medical School graduation programs.

*Less than 1%, but greater than, or equal to, N=1.

The Importance of an AHEC-Sponsored Preceptorship or Rotation in Current Choice of a Specialty

The fact that former AHEC-involved medical students seem more oriented toward primary care--in particular, toward family practice--than their non-AHEC peers does not, of course demonstrate that AHEC-sponsored experiences influenced students to choose family practice or other primary care specialties. For many students, selection of an AHEC-sponsored outstate preceptorship might well reflect an already existing attitude favoring primary care.

Some self-reported survey data, however, suggest that participation in an AHEC preceptorship or rotation was influential for many former AHEC-involved medical students and residents in their choice of a specialty. Table 18 shows that nearly 60% of AHEC-supported preceptorships and rotations were rated as either "very important" or "somewhat important" in helping respondents decide upon a specialty (or subspecialty).

As in decisions concerning an ideal practice location, decisions concerning specialty were apparently more influenced by preceptorships and rotations taken during the last two years of Medical School (Phase D) than either earlier Phase B preceptorships or later residency rotations. These Phase D experiences seemed particularly important for RPAP students; 60% gave their preceptorships the highest possible rating (very important) for influence on specialty choice.

Written responses to an open-ended item requesting comments concerning the quality and influence of AHEC rotations suggested that AHEC preceptorships and rotations were important in choosing a specialty. Content analysis of the volunteered comments resulted in

Table 18

Importance of AHEC - Sponsored Rotation in Choice of a Specialty: Ratings of Former Medical Students and Resident Physicians

Rating	Medical students										Resident physicians	Total, medical students and residents		
	Phase B[a]	Phase D			RPAP			Total						
	(N=32)	74-77 grads (N= 9)	78-81 grads (N=41)	Total[b] (N=51)	74-77 grads (N=29)	78-81 grads (N=123)	Total[b] (N=154)	74-77 grads (N=40)	78-81 grads (N=189)	Total[b] (N=237)	Total (N=77)	74-77 grads (N=78)	78-81 grads (N=249)	Total[b,c,d,f] (N=445)
	%	%	%	%	%	%	%	%	%	%	%	%	%	%
Very important	3	11	37	33	62	59	60	48	47	47	16	38	40	34
Somewhat important	41	33	46	43	17	27	25	20	32	31	14	19	32	25
Slightly important	25	22	7	10	14	4	6	18	7	9	9	14	10	10
Not at all important	22	11	0	2	0	0	0	3	4	3	20	10	5	10
Don't know how important	0	0	0	0	3	0	1	3	0	0[e]	0	1	0[e]	0[e]
This question doesn't apply to me because I'd already decided upon a specialty	6	22	10	12	3	10	8	10	9	9	33	15	11	18
No answer	3	0	0	0	0	0	0	0	1	0[e]	9	1	1	2

Note. See general note for Table 14. This table is based on the question, "How important was this rotation in helping you decide upon a specialty (or subspecialty)?" This question was omitted from the questionnaire mailed to 7 participants in the AHEC-sponsored Family Practice residency rotations, U of M, Minneapolis, during 1979-80.

[a,b,c,d,f] See footnotes a,b,c,d, and f for Table 14.

[e] Less than 1% but greater than, or equal to, N=1.

categories or comment types that included the following: rotation influenced or clarified specialty, residency, or career choices (written by 5% of respondents); rotation influenced specialty choice toward primary care (2%); rotation confirmed already made choice of specialty, location, or practice situation (1%); rotation confirmed already made choice of a primary care specialty (1%); rotation influenced specialty choice away from primary care (1%).

Future Practice of Primary Care in Rural and Underserved Areas: AHEC Participants' Conception of an Ideal Medical Practice Situation for Themselves in 5-10 Years

Survey respondents answered a number of questions so as to describe an ideal practice situation for themselves in 5-10 years, after they had finished their professional training and any required medical service obligations. "Ideal practice situation" was defined as "a combination of professional activities, practice arrangement or work conditions, and practice location that would be ideal for you."

As discussed earlier, two-thirds (65%) of all former AHEC-involved medical students and residents responding to the survey (including 55% of those growing up in urban areas) indicated a rural community as their ideal choice of practice location.

Also discussed earlier is the fact that 81% of former AHEC-involved medical students and residents have chosen a primary care specialty. For 58%, this specialty was family practice.

Respondents were also asked to write additional information concerning their ideal future professional activities in 5-10 years.

In continuing to describe their professional activities, given an ideal practice situation--6% of respondents said they'd practice a subspecialty, in addition to their main specialty. Also, the following activities or practice emphases were each volunteered by 3% of respondents: teaching, patient care, emphasis on more severe problems or trauma, and practice in a rural area.

Responses to other, closed-ended items provided more uniform data from respondents concerning their concept of an ideal practice situation.

Time spent in various activities. In an ideal practice situation for themselves in 5-10 years, respondents, on the average, indicated they'd spend about 80% of their time in care or services to patients; 13%, in teaching; 3%, in research; 4%, in administration of a clinic, hospital, or other health care facility; and 2% in other activities (see Table 19).

Preferred type of practice arrangement. Table 20 shows that nearly all respondents, if able to select an ideal practice situation for themselves in 5-10 years, would avoid a solo practice arrangement. A single-specialty group and multi-specialty group were the most popular types of practice arrangement (preferred by 36% and 31% of respondents, respectively). A partnership was the preferred arrangement for 22%.

Important features of an ideal practice situation. Respondents were asked to rate the importance of each of 15 features that might, or might not, be important to their choice of an ideal practice situation for themselves in 5-10 years, if they had complete freedom to choose.

The following nine features were rated as either "very important" or "somewhat important" by at least 80% of all respondents: "availability

Table 19

Time Spent in Various Activities in an Ideal Practice Situation in 5-10 Years: Estimates of Former AHEC-Involved Medical Students and Residents

Activity	Medical students																				Resident physicians		Total, medical students and residents					
"In an ideal practice situation for you, what percentage of your time would you spend in each of the following activities?"	Phase B[a]		Phase D						RPAP						Total													
			74-77 grads		78-81 grads		Total[b]		74-77 grads		78-81 grads		Total[b]		74-77 grads		78-81 grads		Total[b]		Total[c]		74-77 grads		78-81 grads		Total[b,c,d]	
	(N=32)		(N=13)		(N=55)		(N=69)		(N=42)		(N=134)		(N=178)		(N=57)		(N=214)		(N=279)		(N=93)		(N=65)		(N=222)		(N=384)	
	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD
% in care or services to patients	79	11	74	16	77	18	77	17	81	12	78	13	79	13	79	13	78	14	78	14	78	16	78	15	78	15	78	15
% in teaching	12	6	16	11	11	10	11	11	11	8	13	11	13	10	13	8	12	10	12	10	13	10	13	9	12	11	13	10
% in research	3	5	5	7	4	9	4	9	2	4	3	5	2	5	3	5	3	6	3	6	4	8	3	6	3	7	3	8
% in administration of a clinic, hospital, or other health care facility	4	6	4	5	6	8	5	8	4	5	4	6	4	6	4	5	5	7	4	7	3	5	4	6	5	7	4	6
% in other activities. Please specify:[e]	2	6	1	2	3	7	2	7	3	7	2	4	2	5	2	6	2	5	2	6	1	4	2	6	2	6	2	5

Note. In response to the item specified above, respondents wrote a percentage of time that would be spent in each activity. Item instructions included, "your percents should total 100." Respondents whose percentages totaled less than 85%, or greater than 115%, have been excluded from this table. See general note for Table 11.

Entries in this table are arithmetic means or averages (M's) or standard deviations (SD's) of the percentage estimates made by each subgroup.

[a,b,c,d] See footnotes a, b, c, and d for Table 11.

[e] Other activities mentioned by 3 or more respondents were: studying, training, continuing education (N=27); political or social organizing related to community health care or professional associations (6); and teaching (3).

Table 20

Ideal Type of Practice Arrangement in 5-10 Years; as Specified by Former AHEC-Involved Medical Students and Residents

Type of practice arrangement	Medical students										Resident physicians	Total, medical students and residents		
	Phase B[a]	Phase D			RPAP			Total						
		74-77 grads	78-81 grads	Total[b]	74-77 grads	78-81 grads	Total[b]	74-77 grads	78-81 grads	Total[b]	Total	74-77 grads	78-81 grads	Total[b,c,d]
	(N=32)	(N=15)	(N=55)	(N=69)	(N=42)	(N=134)	(N=178)	(N=57)	(N=214)	(N=279)	(N=93)	(N=65)	(N=222)	(N=384)
	%	%	%	%	%	%	%	%	%	%	%	%	%	%
Solo practice......................	0	0	2	1	2	0	1	2	0[e]	1	3	2	1	1
Partnership........................	13	23	26	26	14	22	20	16	22	20	27	15	22	22
Single specialty group.............	41	31	33	32	48	36	38	44	36	37	31	46	37	36
Multi-specialty group..............	38	31	29	29	24	36	34	26	34	33	28	26	32	31
Other. Please specify[f]............	6	8	5	6	5	4	4	5	4	5	11	5	5	7
Don't know.........................	3	8	6	6	7	3	4	7	3	4	0	6	3	3

Note. See general note for Table 11. Entries in this table are based on responses to the item, "Indicate the type of practice arrangement you would most prefer...(check one)."

[a,b,c,d] See footnoes a, b, c, and d for Table 11.

[e] Less than 1%, but greater than, or equal to, *N*=1.

[f] Other types of practice arrangements mentioned by 3 or more people were: some other form of group or association (*N*=10); a health maintenance organization (5); and a medical school or health sciences center (5).

of good hospitals and other clinical support facilities and services" (so rated by 98% of respondents); "opportunity to enjoy the particiular urban, or suburban, or rural life style I prefer" (97%); "opportunity to share call with other physicians--so I can have adequate time for meetings, recreation, and vacations" (96%); "opportunity to consult with other physicians" (96%); "opportunities for continuing medical education" (94%); "opportunity to practice the full range of skills and knowledge in my specialty" (93%); "opportunity to care for the same patients over an extended period of time" (89%); "opportunities for my spouse to pursue employment, education or other interests" (87%); and "opportunity to provide and supervise a comprehensive range of health care services for the same patients" (81%).

The other features rated, along with each group's rating of all features, are shown in Table 21.

Financial incentives (income potential, availability of loans), while important to respondents, were not rated "very" or "somewhat" important in choice of an ideal practice situation nearly as frequently as many of the professional climate and lifestyle features already discussed (see Table 21).

Other professional goals: Work with underserved patients, work in health maintenance organizations. While opportunities to practice high quality primary care in rural areas are important to many respondents, opportunities to work with medically underserved patients or to work in health maintenance organizations were not generally regarded as important to choice of an ideal practice situation or location. Opportunities to work with medically underserved patients lacking access to health care were rated as very important or somewhat important to choice of an ideal

Table 21
Important Features of an Ideal Practice Situation as Reported by Former Medical Students and Resident Physicians Participating in AHEC Programs

Feature	Medical students										Resident physicians		Total, medical students and residents		
	Phase B[a]	Phase D			RPAP			Total							
	(N=32)	74-77 grads (N=13)	78-81 grads (N=55)	Total[b] (N=60)	74-77 grads (N=42)	78-81 grads (N=134)	Total[b] (N=178)	74-77 grads (N=57)	78-81 grads (N=214)	Total[b] (N=279)	74-77 grads (N= 8)	Total[c] (N=95)	74-77 grads (N=66)	78-81 grads (N=223)	Total[b,c,d] (N=387)
	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%
Opportunity to care for the same patients over an extended period of time	91	69	87	84	79	93	90	75	92	89	75	93	76	92	89
Opportunity to provide and supervise a comprehensive range of health care services for the same patients	81	62	82	78	81	81	31	75	81	80	75	83	74	82	81
Opportunity to enjoy the particular urban, or suburban, or rural life style I prefer	94	92	95	94	100	99	99	98	98	98	75	95	96	98	97
Opportunity to work with a medically underserved group of patients who have lacked access to adequate health care	63	39	44	44	43	42	42	44	44	45	13	35	39	44	41
Opportunity to practice the full range of skills and knowledge in my specialty	100	100	86	88	93	94	94	95	93	93	88	92	94	92	93
Opportunities for my spouse to pursue employment, education, or other interests	97	85	80	80	91	86	87	88	86	86	88	90	88	86	87
Opportunity to earn an income at least equal to the average for other physicians with experience and training similar to mine	59	54	47	49	62	57	58	61	55	56	75	61	64	55	57
Opportunity to live near relatives or long-time friends	53	69	53	55	71	50	55	70	51	55	50	58	67	51	55
Opportunity to purchase or join an already established and desirable practice	66	54	31	36	60	55	56	56	51	52	63	44	58	50	50
Availability of loans or other financial assistance needed to start or purchase a practice	50	0	31	25	14	33	29	11	35	30	25	18	12	35	27
Opportunity to work, during at least part of my practice time, in a prepaid, health maintenance organization	6	0	6	4	7	8	8	5	8	7	0	10	5	8	8
Opportunity to share call with other physicians--so I can have adequate time for meetings, recreation, and vacations	97	92	96	96	98	98	97	97	97	97	88	97	96	96	96
Availability of good hospitals and other clinical support facilities and services	97	92	98	97	100	99	99	98	98	98	88	97	97	98	98
Opportunity to consult with other physicians	100	92	98	97	95	95	95	95	96	96	88	96	94	96	96
Opportunities for continuing medical education	100	77	95	91	93	94	94	90	95	94	88	95	89	95	94
Other feature(s)[e] Please specify these other features:	6	8	4	4	17	5	7	14	5	7	0	6	14	5	7

Note. Entries in this table are percentages of each group who checked each feature as being either "very important" or "somewhat important" to their choice of an ideal practice situation in 5-10 years, "after you have finished your training and your medical service obligations" and "if you have complete freedom to choose." Other response alternatives for each feature were "slightly important," "not at all important," and "don't know how important."

The N's for each group, upon which column percentages are based, represent the total number of respondents; that is the number who returned a questionnaire at least partially completed. These N's were thus not adjusted for respondents who failed to complete individual questionnaire items.

[a,b,c,d] See footnotes a,b,c,d for Table 11.

[e] Other features of an ideal practice situation written in here include professional and clinical support from colleagues and hospitals; opportunities for subspecialty work, research, teaching, family life; etc.

practice situation by 42% of respondents. Only 7% of respondents rated, as very or somewhat important to choice of an ideal practice situation, the opportunity to work at least part-time in a prepaid health maintenance organization.

The Phase B medical students were the follow-up group with the highest proportion (63%) rating as very or somewhat important to choice of an ideal practice situation, the opportunity to work with medically underserved patients (see Table 22). The Phase B group was also generally the youngest group. Only two members had graduated from medical school; most were third year (Phase D) students at the time of the survey. Hopefully, the professional objective of work with underserved patients will continue to be important for the majority of this new generation of physicians.

Impact of the Minnesota AHEC Project on the Supplies of Primary Care Health Professionals

Projecting the approximate one-third proportion of physicians in the present follow-up sample of 1,499 to the total eventual group of 2,200 participants by fall, 1981--the Minnesota AHEC Project will have provided during the entire period 1972-81 outstate rotations and preceptorships for over 700 physicians in training.

Since Table 13 indicates that about two-thirds of AHEC-involved medical students and residents hope to practice in Minnesota, and since Table 16 suggests 81% intend to practice a primary care specialty--then the Minnesota AHEC Project will eventually have made a substantial contribution to the professional education of an estimated 400 or so Minnesota primary-care physicians.

Table 22

The Importance of Work With Medically Underserved Patients as a Feature of an Ideal Practice Situation

Rating	Medical students										Resident physicians		Total, medical students and residents		
	Phase B[a]	Phase D			RPAP			Total							
	(N=32)	74-77 grads (N=13)	78-81 grads (N=55)	Total[b] (N=69)	74-77 grads (N=42)	78-81 grads (N=134)	Total[b] (N=178)	74-77 grads (N=57)	78-81 grads (N=214)	Total[b] (N=279)	74-77 grads (N= 8)	Total[c] (N=95)	74-77 grads (N=66)	78-81 grads (N=223)	Total[b,c,d] (N=387)
	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%
Very important	13	8	18	16	5	7	6	5	10	9	0	3	5	10	8
Somewhat important	50	31	26	28	38	35	36	39	34	36	13	32	35	34	34
Slightly important	22	31	38	36	31	40	38	30	38	36	13	41	29	39	38
Not at all important	9	31	13	16	24	13	15	25	13	15	50	19	27	13	16
Don't know how important	6	0	4	3	2	5	5	2	5	5	13	3	3	5	4
No answer	0	0	2	1	0	0	0	0	1	0[e]	13	2	2	0[e]	1

Note. Former medical students and residents participating in AHEC programs were asked to rate the importance of a number of features to their choice of an ideal practice situation or location in 5-10 years--after they have finished their training and medical service obligations, and if they have complete freedom to choose. (See also Table 21.) The ratings in this table were for a feature described as, "Opportunity to work with a medically underserved group of patients who have lacked access to adequate health care." The group N's, upon which column percentages are based, represent respondents; that is, persons who returned a questionnaire at least partially completed.

[a,b,c,d] See footnotes a,b,c, and d for Table 11.

[e] Less than 1%, but greater than, or equal to, N=1.

Participation in AHEC programs has apparently been influential in the decisions of many medical students and residents to practice primary care in rural or outstate underserved areas--if not specifically with underserved patients.

The Minnesota AHEC Project has probably influenced the careers of former AHEC participants, representing many other professional fields besides medicine, who now live and work in rural and outstate areas of Minnesota (see Figure 2 and Table 5). With these other groups, however, one does not have survey self-reports that allow these former participants to rate the influence of AHEC experiences on career decisions.

As discussed in the Introduction to this report, the Minnesota AHEC Project, while substantially funded (over 5.8 million during the entire period 1972-81), still represented only a small portion of health professional training in Minnesota. Yet this Project provided significant rural and outstate training experiences that probably led to improved supplies of primary care health professionals in rural and outstate areas. When their training is complete, AHEC-involved former medical students and residents will probably represent nearly 9% of Minnesota's physicians. AHEC-trained dentists will probably eventually represent about 5% of Minnesota's dentists; and AHEC-trained registered nurses, about 1½% of Minnesota's supply of these professionals. (See Introduction also.)

3. What Was the Minnesota AHEC Project's Contribution to Decentralization of Health Professional Training in Minnesota?

The Minnesota AHEC Project has made substantial contributions to the decentralization of health professional training in Minnesota--largely, by providing off-campus preceptorships, clinical rotations, and courses for health professional students; but also by developing and sending independent study materials to outstate locations, and by making Minneapolis-based, library-extension reference services available to students training outstate.

Another contribution of the AHEC Project has been the encouraging and planning of improved U of M Health Sciences outreach activities.[3]

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[3] Partly in response to evaluation reports (e.g., Feldman et al.) and also to prepare for the possibility that one or more regional AHECs would have to be developed in outstate areas, in addition to the central U of M AHEC--the Minnesota AHEC Advisory Board developed a written report and plan for improved coordination of U of M Health Sciences educational and service outreach acitivities (Minnesota Area Health Education Center Advisory Board, Ad Hoc Task Force on Outreach, 1979). This report recommended a Health Sciences Outreach Office, headed by an Assistant Vice President who would report directly to the Vice President for Health Sciences. The proposed organizational structure and relationships of this Office, and the proposed functions of this Office, were designed to provide greater incentives and authority for more intensive,well coordinated Health Sciences outreach activities.

In response to the initiatives of both the AHEC Advisory Board and other Health Sciences planning groups, the position of Assistant Vice President for Health Sciences Outreach was created in 1980. Under the new Health Sciences organizational structure that now includes the Outreach Office, it would be much easier now than in 1979 for a project like AHEC to obtain, from various schools and departments, the cooperation and commitments needed to establish regional educational centers for health professional students and practitioners.

Decentralization of Training Through Off-Campus Preceptorships, Clinical Rotations, and Courses

When the Minnesota AHEC Project ends in October, 1981, it will have provided or supported, since its inception in 1972, a total of about 2,400 different health professional training experiences for about 2,200 different students and resident physicians, in about 10 different professional fields.

Figure 1 summarizes the proportions of the 1,580 training experiences (those taking place during the period, and for the AHEC programs, under study--namely, 1972-80) that took place in each Minnesota county and Health Service Area (HSA).

Table 23 provides a breakdown of the locations of these training experiences for each of the 15 separate follow-up groups.

Table 24 shows the type of (nearly always, Minnesota) community in which these 1,580 different training experiences took place.

About half of the AHEC-supported training experiences took place in rural, non-metropolitan areas. About one-fifth of these experiences took place in the most rural Minnesota communities, at least 50 miles from a Standard Metropolitan Statistical Area (SMSA) (see Table 24).

That half of AHEC experiences taking place in urban areas largely took place in the main city portions of Minnesota SMSAs; namely, in the cities of Minneapolis (about 20%), St. Paul (4%), Duluth (about 10%), Rochester (6%), and Moorhead (4%). Only 3% of AHEC training took place in suburbs.

Table 23
Locations at Which Follow-up Groups Received AHEC-Sponsored Training

Location of AHEC training	Medical students and residents						Dental students		Nursing students			Pharm. stdts. (N=128) %	Diet. stdts. (N=52) %	Occ. ther. stdts. (N=44) %	Phy. ther. stdts. (N=75) %	Stdts. in soc. work, oth. fields, took inter-dis. prog.		Total, all AHEC training experiences[d] (N=1,580) %
	Medical students				Res.[b] (N=143) %	Total, med stdts. res.[c] (N=534) %	Took rural rot. (N=45) %	Total (N=72) %	Took non-UofM cses. (N=127) %	Took UofM cses. (N=227) %	Total (N=354) %					Took out-state prog. (N=85) %	Total (N=114) %	
	Phase B (N=45) %	Phase D (N=98) %	RPAP (N=248) %	Total (N=391) %														
Minnesota, total......	100	88	90	9[illegible]	100	93	100	100	100	97	98	100	98	98	100	95	96	97
HSA 1: Agassiz		4	4	4	5	4	9	6		12	8	1			1	2	2	4
Beltrami............		2		1	1	1	2	1		2	1					2	2	1
Polk...............		1		0[e]		0[e]	4	3		9	6				1			2
HSA 2: W. Lake Superior	87	19	12	22	23	22	24	15		18	12	8	21	9	19	25	18	15
Carlton............	2	2	1	2	1	1	2	1				2						1
Itasca.............	2	2		2	1	2	2	1										1
St. Louis..........	76	14	5	15	20	16	13	8		18	11	5	21	9	17	25	18	12
HSA 3: Min-Dak		5	8	6	1	5			46	2	19	13		2	12			7
Clay...............		3	1	1		1			46	1	18							4
Otter Tail.........		1	4	3		2				0[e]	0[e]	9		2	5			2
HSA 4: Central Minn.	13	29	17	19	13	19	24	15	46	23	32	18	54	73	36	40	30	24
Benton.............		1		0[e]		0[e]	2	1		4	2	2		2	4			1
Cass...............	2	1	2	2	8	3				1	1							1
Crow Wing..........	4	1	2	2		1				1	1	2			7			1
Isanti.............	2	12	2	5	1	6	2	1		4	2	1		9	17	39	29	6
Morrison...........			2	1		1	2	1	1	0[e]	1	2			4			1
Stearns............		6	3	3	1	3	2	1	45	11	23	3	54	61	4	1	1	10
Wadena.............	2		1	1	2	1	4	3		0[e]	0[e]							1
Wright.............		2	1	1		1				1	1	7						1
HSA 5: Metropolitan		10	7	7	49	19	7	42	5	4	4	49		9	11	22	42	29
Carver.............		2	4	3		2	7	4				1						1
Dakota.............					8	2						2		2	4	1	1	1
Hennepin...........			2	1	7	4		38	5	4	4	28		7	7	21	41	21
Ramsey.............					33	8						13						4
Washington.........		4	2	2	1	2						4						1
HSA 6: Southwestern		10	32	23	8	18	24	15	2	7	5	3		2	11			9
Blue Earth.........			2	1		1				7	4							1
Brown..............		2	2	2	1	2									7			1
Chippewa...........			4	2	3	3	2	1				1						1
Faribault..........			2	1	2	2	4	3										1
Kandiyohi..........		5	5	5		3			2		1			2				1
HSA 7: Southeastern		10	10	9	1	7	11	7		31	20	8	2	2	11	6	4	9
Goodhue............		5	2	3	1	2												1
Olmsted............		1		0[e]		0[e]				31	20	8		2	5	6	4	6
Winona.............		3	4	3		2	4	3										1
Minnesota, several locations													21					1
Wisconsin..........		12	1	4		3												1
Not known..........			9	6		4			0	3	0		2	2		5	4	3

Note. The total column N's, upon which table entry percentages are based, are each the N of different AHEC-sponsored training experiences in which members of the follow-up group participated, and for which the geographic location of the training experiences is known. For 3 types of training experiences -- Phase D Preceptorships, the Rural Physician Associate Program, and the Family Practice Residency Rotations at the U of M, Minneapolis -- counts are for the period September, 1972 - June, 1980. For all other training experiences, counts are for the period September, 1972 - October, 1979. Note that members of a follow-up group bearing a particular AHEC program name may have taken AHEC training experiences outside that program. For example, the "Phase D group" of former medical students participated in a total of 98 different AHEC-sponsored training experiences. Table 3 shows that the great majority of these experiences were Phase D preceptorships; however, additional rotations taken by some members of the Phase D group included interdisciplinary rotations at a mental health center, later residency training rotations, etc.

Of the total group of 1,490 former AHEC participants, slightly over 8% took more than one AHEC-sponsored experience for which location was known. A maximum of two training locations was tabulated per participant.

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[a] Only locations of 10 or more AHEC-sponsored training experiences are listed separately in this table. Of course, counts from all locations are reflected in the Health Service Area (HSA) and state totals. The following 13 Minnesota counties were not locations for AHEC-sponsored training: in HSA 1, Kittson, Lake of the Woods, Marshall, Norman; in HSA 3, Stevens, Traverse, Wilkins; in HSA 4, Sherburne; in HSA 6, Lac Qui Parle, Waseca; in HSA 7, Dodge, Houston, Rice.

[b,c] See footnotes b and c for Table 3.

[d] Because the following follow-up groups all took all of their training experiences in Hennepin County, these groups have been included in these row totals, but omitted from separate listing by column headings: 27 dental students who took an urban rotation in the Preventive Dentistry Program; 185 dental hygiene students, who participated in the Preventive Dental Hygiene Program; 29 students in social work -- or fields other than medicine, dentistry, nursing, allied health, etc. -- who took an urban rotation at the Community University Health Care Center in Minneapolis.

[e] Less than 1%, but equal to, or greater than, N = 1.

Table 24

Locationsat Which Follow-up Groups Received AHEC-Sponsored Training: Type of Community

Type of community	Medical students and residents						Dental students		Nursing students							Stdts. in soc. work, oth. fields, took inter-dis.prog.		
	Medical students																	
	Phase B (N=45) %	Phase D (N=98) %	RPAP (N=248) %	Total (N=391) %	Res.[b] (N=143) %	Total, med stdts. res.[c] (N=557) %	Took rural rot. (N=45) %	Total (N=72) %	Took non-UofM cses. (N=127) %	Took UofM cses. (N=227) %	Total (N=354) %	Pharm. stdts. (N=128) %	Diet. stdts. (N=51) %	Occ. ther. stdts. (N=44) %	Phy. ther. stdts. (N=75) %	Took out-state prog. (N=85) %	Total (N=114) %	Total, all AHEC training experiences[d] (N=1,580) %
Main city portion of a metropolitan (metro area)......	71	13	4	14	59	27	7	42	51	54	53	51	71	16	25	49	62	46
"Inner" suburb, just outside the main city portion of a metro area..............	0	0	0	0	0	0	0	0	0	0	0	2	.0	0	0	0	0	0[e]
"Outer" suburb, which may be a town, small city, or even a rural area at the outskirts of a metro area.................	0	6	2	3	9	4	2	1	0	2	1	8	0	2	9	1	1	3
Non-metro area community within 50 mi. of a metro area......................	4	53	30	33	4	27	53	33	46	20	30	34	4	75	40	41	31	27
Non-metro area community 50 or more mi. from a metro area.................	24	28	54	44	27	38	38	24	2	20	14	5	2	5	25	2	2	19
Don't know....................	0	0	9	6	0	4	0	0	0	3	2	0	24	2	0	6	4	5

Note. The column N's, upon which table entry percentages are based, are each the N of different AHEC-sponsored training experiences in which members of the follow-up group participated, and for which the geographic location of the training experience is known. A maximum of 2 training experiences was tabulated for each participant. This table differs then from tables in which column N's represent people or participants.

[b] Includes only those resident physicians who had not previously participated in an AHEC-supported undergraduate medical education program (e.g., Phase D, RPAP). Former participants in both AHEC-supported undergraduate medical education programs and AHEC-supported graduate medical school education programs--such participants were classified into follow-up groups according to their undergraduate AHEC program experience.

[c] Includes an additional 23 former medical students and residents participating in AHEC-supported interdisciplinary programs.

[d] Because the following follow-up groups all took all of their training experiences in Hennepin County, these groups have been included in these row totals, but omitted from separate listing by column headings: 27 dental students who took an urban rotation in the Preventive Dentistry Program; 185 dental hygiene students, who participated in the Preventive Dental Hygiene Program; 29 students in social work--or fields other than medicine, dentistry, nursing, allied health, etc.--who took an urban rotation at the Community University Health Care Center in Minneapolis.

[e] Less than 1%, but equal to, or greater than, N=1.

If one defines decentralized health professional education in Minnesota as that taking place outside the two major health sciences training centers in Minnesota--Minneapolis—St. Paul and Rochester--then about 60% of the 1,580 AHEC-supported training experiences represented decentralization to outstate locations.

If we omit Hennepin and Ramsey counties from the list of federally designated Primary Medical Care Shortage Areas (see Table 6), on the grounds that only the Indian American populations of those counties are officially underserved, then about 12% of all AHEC training experiences took place in a county partly or wholly designated (as of 1978) as a Shortage Area.

Figure 1 and Table 23 show that AHEC training experiences were very widely distributed throughout Minnesota--and throughout Minnesota rural areas. Of the 87 Minnesota counties, 27 were locations of 10 or more different AHEC training experiences. Only 13 counties were not locations for AHEC training.

The Minnesota AHEC programs with the largest proportions of training experiences at rural sites were the Dental Preceptorship Program, the Rural Physician Associate Program, Phase D Preceptorships, and Occupational Therapy Rural Rotations. At least 80% of the training experiences for each of these programs took place in rural areas. Table 23 also suggests that the training experiences for these programs were also widely dispersed geographically.

4. What Was the Quality of Health Professional Training in Programs Funded Under the Minnesota AHEC Project?

Efforts were made to insure that each program included in the Minnesota AHEC Project provided high quality training and educational experiences. Funding was contingent on each program's preparing written training and instructional objectives, along with detailed written plans for staffing and implementing the programs. The development of each program was closely monitored, and charted via quarterly written progress reports.

Evidence available from the survey of former AHEC-involved medical students and residents suggests that AHEC-supported training experiences were generally of excellent quality.

Former AHEC-involved medical students and resident physicians were asked to rate up to two AHEC-supported preceptorships or rotations in terms of "giving you direct experience with the range of clinical problems in the specialty area of the rotation" and "helping you develop professional skills in the specialty area of the rotation."

Experience With a Range of Clinical Problems

Table 25 shows that 93% of all 445 preceptorships and rotations rated (virtually all those taken, also) by former AHEC-involved medical students and residents were regarded as "excellent" or "good" in giving experience with the range of clinical problems in the specialty. For the great majority of the rotations, the relevant specialty was family practice or general internal medicine. Two-thirds (67%) of the rotations alone were rated excellent. With the exception of Phase B preceptorships (75% were

Table 25
Experience With a Range of Clinical Problems
During AHEC - Sponsored Rotations:
Ratings of Former Medical Students and Resident Physicians

Rating	Medical students										Resident physicians	Total, medical students and residents		
	Phase B[a]	Phase D			RPAP			Total						
	(N=32)	74-77 grads (N= 9)	78-81 grads (N=41)	Total[b] (N=51)	74-77 grads (N=29)	78-81 grads (N=123)	Total[b] (N=154)	74-77 grads (N=40)	78-81 grads (N= 189)	Total[b] (N=237)	Total (N=77)	74-77 grads[f] (N=78)	78-81 grads[f] (N=249)	Total[b,c,d,f] (N=445)
	%	%	%	%	%	%	%	%	%	%	%	%	%	%
Excellent	28	78	78	78	69	87	84	68	77	75	57	67	71	67
Good	47	22	22	22	24	11	14	28	18	20	34	29	21	26
Fair	13	0	0	0	7	1	2	5	3	3	5	4	5	5
Poor	13	0	0	0	0	1	1	0	3	2	1	0	2	2
No answer	0	0	0	0	0	0	0	0	0	0	3	0	0	0[e]

Note. See general note for Table 14. This table is based on the question, "How would you rate this rotation in terms of giving you direct experience with the range of clinical problems in the specialty area of the rotation?"

[a,b,c,d,f] See footnotes a,b,c,d and f for Table 14.

[e] Less than 1%, but greater than, or equal to, N=1.

rated as excellent or good), proportions of 91-100% of the rotations taken by each separate follow-up group were also rated excellent or good--with a majority typically falling in the excellent range, for both undergraduate and graduate (residency) rotations.

Development of Professional Skills

Nearly 9 of 10 (87%) preceptorships or rotations taken by former AHEC-involved medical students or residents were rated excellent or good in helping develop professional skills in the specialty area of the rotation (see Table 26). Over half (55%) of the rotations were rated excellent in this area of helping develop primary care skills. Half or more of the rotations of nearly every follow-up group--representing both undergraduate and graduate rotations, and rotations of both earlier (1974-77) and later (1978-81) U of M Medical School graduates--were rated excellent. The exceptions were Phase B preceptorships (usually in family practice or pediatrics, in the Duluth area); 19% of these were rated excellent.

Written Comments Concerning the Quality of AHEC-Supported Preceptorships and Rotations

Former AHEC-involved medical students and residents were invited to write comments concerning the quality (and influence) of up to two different AHEC-supported rotations. Content analysis resulted in the following categories or types of comments concerning rotation quality. Nearly 1 in 10 (9%) of the 387 respondents described their rotation(s) as an opportunity for direct patient care (e.g., to learn primary, ambulatory care; to learn interpersonal aspects of medicine, etc.).

Table 26
Development of Professional Skills During AHEC - Sponsored Rotations: Ratings of Former Medical Students and Resident Physicians

Rating	Medical students										Resident physicians	Total, medical students and residents		
	Phase B[a]	Phase D			RPAP			Total						
		74-77 grads	78-81 grads	Total[b]	74-77 grads	78-81 grads	Total[b]	74-77 grads	78-81 grads	Total[b]	Total	74-77 grads	78-81 grads	Total[b,c,d,f]
	(N=32)	(N=9)	(N=41)	(N=51)	(N=29)	(N=123)	(N=154)	(N=40)	(N=189)	(N=237)	(N=77)	(N=78)	(N=249)	(N=445)
	%	%	%	%	%	%	%	%	%	%	%	%	%	%
Excellent	19	56	51	53	72	74	74	65	61	62	49	59	57	55
Good	34	33	44	41	10	22	20	18	28	26	38	27	31	32
Fair	34	11	2	4	17	2	5	18	7	9	9	14	10	10
Poor	9	0	2	2	0	1	1	0	3	2	1	0	2	2
No answer	3	0	0	0	0	1	1	0	1	1	3	0	1	1

Note. See general note for Table 14. This table is based on the question, "How would you rate this rotation in terms of helping you develop professional skills in the specialty area of the rotation?"

[a,b,c,d,f] See footnotes a,b,c,d and f for Table 14.

Other comment categories included: good supervision by preceptors or staff that were helpful, or generous with their time (written by 6% of respondents); good models concerning doctor's role in community, practice management, etc. (6%); general positive evaluation of the rotation (4%); enjoyed the rotation or location (4%); poor supervision (4%); did not enjoy rotation or location (2%); poor learning environment (2%); observed good patient care (1%); given appropriate responsibility (1%); poor role models (1%).

DISCUSSION

Results of this research suggest that decentralization of health professional education through off-campus preceptorships, clinical rotations, and courses is a viable approach to improving the supplies of health professionals in areas remote from a health sciences center.

This section will discuss (a) the impact of the Project on the professional plans of AHEC-involved medical students and residents; (b) the validity of Project impact assessments based on self-reported survey data; and (c) recommendations for improving the national AHEC effort, and for planning and improving programs similar to those supported by the Minnesota AHEC Project.

The following discussion, like previous sections of this report, focuses largely on research results involving AHEC-involved medical students and residents.

Summary of Project Impact on the Professional Plans of AHEC-Involved Medical Students and Resident Physicians

Available evidence from the survey of former AHEC-involved medical students and residents suggests that participation in AHEC-sponsored preceptorships or rotations (usually in outstate areas) has made a measurable contribution to the career decisions of these young professionals concerning practice location and specialty choice.

Among the total group of 488 former AHEC-involved medical students and residents, 81% have chosen a primary care specialty. Among the 376 within the total group who responded to the survey, 59% believed the AHEC experience was either "very" or "somewhat" important to their specialty decision.

Among survey respondents, nearly two-thirds indicated that a rural community would be an ideal practice location for themselves when they have completed all training and any medical service obligations. For 72% the AHEC experience was very or somewhat important to their practice location decision. Recall that 55% of those respondents growing up in urban areas indicated a rural community as their ideal choice of practice location.

A number of questions on the AHEC survey provided an opportunity for respondents to describe additional aspects of an ideal practice situation for themselves in 5 to 10 years. "Ideal practice situation" was defined as "a combination of professional activities, practice arrangement or work conditions, and practice location that would be ideal for you."

Specific features of the ideal practice situation, upon which a clear majority of respondents agreed, included: (a) a high (average 78%) percent of time spent in care or services directly to patients; (b) opportunities to provide comprehensive care for the same patients over an extended period; (c) availability of good hospitals, consultation with other physicians, and good clinical support facilities; (d) cooperative arrangements with other physicians; including group practice or partnership with others, and the sharing of night and weekend call; (e) opportunities for continuing education; (f) opportunities to enjoy the particular urban, suburban, or rural lifestyle one prefers; and (g) opportunities for one's spouse to become involved in a school or job in the community.

Clearly, the specialty choice and practice location goals of these former AHEC participants are entirely consistent with the AHEC Project goals of improved supply and distribution of primary care health professionals. Furthermore, AHEC-program experiences have apparently influenced the decisions of these former medical students and residents toward rural primary care.

As revealed in the AHEC survey, the concept these respondents hold of an ideal practice situation for themselves in 5 to 10 years also accords with the AHEC Project goals of high quality primary care in rural and outstate areas.

Presumably, if these former AHEC participants are offered opportunities to practice in rural or outstate areas where many of these practice features are present, then these young physicians and physicians-in-training will soon settle in these areas. Some already have. Of the 108 former participants who had completed their residency training as of mid-1980, about one-third (32%) were practicing in rural communities.

Financial incentives such as income potential or availability of loans were not rated "very" or "somewhat" important in choice of an ideal practice situation nearly as often as many professional climate and lifestyle features (see Table 21). Overall, financial incentives were very or somewhat important for 57% of the respondents.

Opportunities to work with underserved patients lacking access to adequate health care were rated as very or somewhat important to choice of an ideal practice situation by 42% of respondents. The opportunity to work at least part-time in a health maintenance organization was rated very or somewhat important to this decision by only 8%. Because of the wording of the items, these results do not indicate opposition to HMOs or to work with the underserved. They do, however, indicate these two features are less salient than many others to choice of an ideal practice situation.

The Validity of Project Impact Assessments Based on Self-Reported Survey Data

While evidence suggests that AHEC programs made a measurable contribution to the career development of young health professionals, it is difficult to assess the importance of AHEC experiences--for example, in preceptorships and other rotations for medical students and residents--as determinants of specialty choice or choice of practice location. Positive survey ratings or testimonials by former AHEC-program participants--assertions that AHEC experiences were influential in career choices toward practicing primary care in rural areas--do not allow one to estimate the degree of such influence in relation to other influences.

In fact, all outcome measures--survey responses, specialty choices, later professional locations--in research such as this are somewhat difficult to interpret. This difficulty follows from the lack of a true control group. That is, medical students were not randomly assigned to AHEC-supported rural primary care preceptorships vs. to some non-AHEC clinical training experience (e.g., hospital-based urban rotations), and then monitored with comparable follow-up data-collection procedures. Instead, medical students voluntarily self-selected themselves to take elective AHEC-supported primary care preceptorships in rural areas.

Under the actual conditions of this research design, subsequently observed outcomes (e.g., survey responses, professional choices)--even differences between AHEC-involved medical students and some comparison group of non-AHEC involved medical students--cannot readily be attributed to AHEC experiences alone. For many outcomes, one might argue that observed outcomes and differences were due to pre-AHEC-program attributes unique to AHEC participants--attributes already present when they volunteered for AHEC programs.

Differences between AHEC and non-AHEC Medical School graduates. Clearly, AHEC-involved medical students differ from their non-AHEC peers. As shown previously, AHEC-involved U of M Medical School graduates were about three times more likely than a representative, "control" group of non-AHEC graduates to have chosen the specialty of family practice (62% vs. 23%, respectively).

Additional study of AHEC vs. non-AHEC medical students revealed that AHEC students were more likely to have obtained financial aid providing incentives for later practice in underserved and rural areas. AHEC-involved Medical School graduates in the Classes of 1976-79 were much more likely than their non-AHEC peers, while in Medical School, to have obtained a federal Health Professions Student Loan or to have participated in the associated federal Health Professions Loan Repayment Program (34% vs. 5%, respectively). These AHEC students were also more likely than non-AHEC students to have obtained a State-funded Minnesota Medical and Osteopathic Loan (12% vs. 4%). Both these federal and State loan programs have provided loan forgiveness for medical practice in underserved areas (the federal and State lists of underserved areas differ).

The AHEC graduates in the Classes of 1978 and 1979, but not in the earlier Classes of 1976 and 1977, are more likely than non-AHEC graduates to be located professionally in Minnesota. As of the follow-up in mid-1980, most of these graduates in both AHEC and non-AHEC groups were still in residency training. For the Classes of 1978 and 1979, 70% of AHEC graduates and 51% of non-AHEC graduates were training in Minnesota.

For the classes of 1976 and 1977, identical two-thirds proportions of AHEC and non-AHEC graduates were located in Minnesota, with some members of this group having begun their first post-residency practice.

In short, the AHEC-involved medical students were more likely than the non-AHEC students to have chosen family practice as a specialty, to have taken their residency training in Minnesota (a good index of later practice location intentions), and to have obtained a government loan or loan forgiveness agreement with incentives for later practice in a rural or underserved area.

Self-selection or "creaming" as an explanation for some research outcomes. It would, of course, be improper for the AHEC Project to claim sole credit for the preceding research outcomes indicating that former AHEC participants, in comparison to their non-AHEC peers, are much more inclined toward family practice as a specialty, are somewhat more inclined toward practice in Minnesota, and may be more likely to seek loan forgiveness through practice in an underserved area (although non-AHEC graduates may settle in these same areas for other reasons). If it made such claims, the AHEC Project would be guilty of "skimming" or "creaming"; that is, of drawing off a positive public relations advantage from an outcome it had not solely produced; namely, AHEC graduates' decisions to enter family practice in Minnesota.

Self-reported ratings of AHEC-program influence on career decisions. Even when medical students and residents were asked to honestly rate the influence of their AHEC experiences on choice of specialty and practice location, there is some question about the validity of such ratings.

How does one know, for example, that when participants say an AHEC program has influenced their decision to practice primary care in a rural area that they are not unduly influenced by, or simply restating, a possibly long-standing interest, predating their AHEC participation, in primary care in rural areas?

Several analyses bear on this question of the validity of self-reported ratings made during the AHEC survey. These analyses, now to be discussed, support the validity of the ratings.

AHEC preceptorships: a formative experience during a formative period in medical education. AHEC-supported preceptorships and rotations occurring during the (Phase D) third and fourth years of Medical School (e.g., the 6-week Phase D Preceptorships and the 9-12 month Rural Physician Associate Program (RPAP) preceptorships) were rated more important in influence on specialty choice than AHEC-supported preceptorships and rotations occurring either earlier in medical education (e.g., Phase B Preceptorships) or later (e.g., residency rotations).

This fact suggests three things. First, it suggests, as hypothesized earlier in this report, that Phase D is a crucial formative period during medical education, when students make important career decisions. Second, this fact suggests that AHEC preceptorships during Phase D were important formative experiences in these career decisions. Third, because the importance ratings of AHEC preceptorships vary in accord with this hypothesis about Phase D as a key period, the validity of these importance ratings is supported.

In short, 75-90% of AHEC experiences were rated as very or somewhat important--and probably were important--to the career decisions concerning choice of specialty or practice location. As predicted, however, AHEC clinical experiences in rural primary care were particularly important during

Phase D, when medical students had sufficient academic training to understand the dimensions of medical science and practice, but had not firmly committed to a specialty or practice location.

AHEC-supported Phase D Preceptorships and RPAP preceptorships were both generally rated higher in importance than any other AHEC-supported undergraduate or graduate medical education experiences. The RPAP preceptorships were given notably higher ratings than any other preceptorships or rotations. With 60% given the "very important" rating, these RPAP preceptorships were twice as likely as any other preceptorships or rotations to receive this highest rating for helping students decide upon both a specialty (or subspecialty) and on an ideal type of practice location.

The importance of AHEC experiences for former medical students and residents who have selected different specialties and types of practice location. If importance ratings for AHEC-supported rural-area primary care preceptorships were merely reflections of already determined career choices, then these ratings should be highest for those who have chosen a primary care specialty and intend to practice in a rural area.

Table 27, however, shows that AHEC training experiences were important self-reported influences on the practice location intentions of a majority of all respondents, including 57% of those who now intend to practice in urban or suburban areas. Among those who now intend ideally to practice in rural areas in 5-10 years, about 80% rated the AHEC training experience as very or somewhat important in helping them decide what would be an ideal type of practice location for themselves.

Table 28 shows that AHEC training experiences were important self-reported influences on the specialty choices of over 60% of all respondents.

Table 27

Self-Reported Influence of AHEC Training Experience on Practice Location Intentions, for Medical Students and Residents Preferring Different Types of Practice Location

Importance of AHEC training experience on practice location intentions	Ideal type of practice location					Total
	Non-metro community 50 or more mi. from metro area (N=157) %	Non-metro community within 50 mi. of metro area (N=96) %	"Outer" suburb (N=45) %	"Inner" Suburb (N=21) %	Main city portion of metro area (N=49) %	(N=394) %
Very important.............	46	41	40	29	18	38
Somewhat important.........	31	41	31	38	39	36
Slightly important.........	11	10	13	14	22	12
Not at all important.......	11	6	11	19	14	10
Don't know how important...	1	2	0	0	0	1
No answer..................	1	0	4	0	6	2

Note. Entries in this table are based on respondents' answers to two survey items: First, the question, "How important was this rotation in helping you decide what would be an ideal practice location for you ?" (About 15% of respondents had taken more than one rotation or preceptorship. For such respondents, the importance rating for only one rotation--usually the most recent or most important--was used in this table.) The second item, "Indicate the type of community in which you hope to practice in 5-10 years." ("Other," "Don't know," and "No answer" categories for the type of community item have been omitted from separate listing here as column headings; however, respondents in these categories have been included in the column marked "Total.")

The dependence between importance ratings and ideal type of practice location (with "Other," "Don't know," and "No answer" categories omitted from both items) barely failed to meet conventional standards of statistical significance: Chi square = 18.5, df = 12, p = .10.

Table 28

Self-Reported Influence of AHEC Training Experience on Specialty Choice, for Medical Students and Residents Selecting Different Types of Specialty

Importance of AHEC training experience in specialty choice	Current specialty choice			Total
	Family practice (N=241) %	Other primary care specialty: internal medicine, obstetrics-gynecology, or pediatrics (N= 88) %	All other specialties (N= 57) %	(N=386) %
Very important................	35	42	32	36
Somewhat important...........	22	34	28	26
Slightly important...........	10	6	16	10
Not at all important.........	10	5	5	8
Don't know how important.....	0	0	4	1
...doesn't apply... I'd already decided upon a specialty.................	19	13	11	16
No answer	3	1	5	3

Note. Entries in this table are based on (a) the best available data on current specialty choice, from survey or archival sources; and (b) answers to the survey question, "How important was this rotation in helping you decide upon a specialty (or subspecialty)?" (about 15% of respondents had taken more than one rotation or preceptorship. For such respondents, the importance rating for only one rotation--usually the most recent or most important--was used in this table.)

The dependence between importance ratings and specialty choice categories (with "Don't know," "doesn't apply," and "No answer" categories omitted from the importance item) barely failed to meet conventional levels of statistical significance: Chi square = 10.8, df = 6, $p = .09$.

Those groups currently (as of the end of the follow-up) selecting family practice, other primary care specialties, or non-primary-care specialties did not differ markedly from one another in their ratings of the degree to which AHEC preceptorships or rotations had helped them decide upon a specialty (or subspecialty). For former AHEC participants whose current specialty choice is internal medicine, the AHEC experiences may have been particularly important to this choice; 83% rated the AHEC experience as very or somewhat important in helping them decide upon a specialty or subspecialty.

In summary, Tables 27 and 28 show that AHEC preceptorships and rotations were seen as influential even among AHEC participants who chose specialties or practice locations different from those of their AHEC experience. Hence, it would be unfair to assert that positive ratings of AHEC influence were simply restatements of a pre-AHEC interest in primary care in rural areas.

One can also be more confident that high ratings did reflect real influence among those many former AHEC participants who have decided to practice primary care in rural communities.

Undoubtedly, for many medical students and residents, AHEC experiences confirmed tentative career choices that had already been made; many respondents wrote comments to that effect, as discussed previously. Confirmation of tentative career choices through clinical experience is, however, a valuable AHEC program outcome; as is the dissuading of students from primary care or rural-area careers while they have the freedom to explore more suitable career options.

Another approach to assessing the validity of rated AHEC-program influence. Partial correlation methods were used to determine for

Phase D and RPAP follow-up groups the relation between ratings of AHEC preceptorships and type of intended future practice location, while statistically controlling or holding constant the influence of three pre-AHEC-program background variables: type of hometown, participation in a loan program with forgiveness for underserved-area practice, and Medical School specialty track. Medical School track was scaled according to degree of emphasis on primary care, with high = family practice track; medium = internal medicine, pediatrics, or obstetrics and gynecology; and low = all other specialties.

With these three background variables held constant, there remained small, but statistically significant, partial correlations between type of future practice location and two rotation ratings--namely, importance of rotation in helping decide upon an ideal practice location (partial $\underline{r}$=.29); and rating of the rotation in terms of giving direct experience with a range of clinical problems in the (primary care) specialty area of the rotation (partial $\underline{r}$=.15).

That is, even when important background variables are controlled (treated as if unrelated to intended future practice location), an AHEC preceptorship or rotation that provides experience with a range of clinical problems and that is rated as important to practice location intentions--such a preceptorship or rotation is also related to a decision ideally to practice in a rural area. Again, the validity of rated AHEC-program influence is supported.

Recommendations for Improving the National AHEC Effort and for Improving Programs Similar to Those Supported by the Minnesota AHEC Project

The following recommendations should be considered in seeking ways to improve the national AHEC effort, and to plan and improve programs similar to those supported by the Minnesota AHEC Project:

1. Federal regulations for programs designed to improve the supply and distribution of health professionals should require decentralized training, but should not mandate a particular form of decentralization (e.g., regional AHECs based in community hospitals).

Decentralized health professional education can be accomplished effectively in a variety of ways. The Minnesota AHEC Project has used outstate preceptorships, outstate clinical rotations in hospitals and other health care settings, independent study materials sent to outstate locations, and library extension services, based in Minneapolis, for students training outstate.

Regional AHECs, based in community hospitals, are certainly excellent vehicles for decentralized health professional education. However, when regional AHECs are difficult to implement in view of a state's particular demographics or health care delivery system, then such regional AHECs should not be required. A central AHEC office administering decentralized programs should continue to be allowed--unless regional AHECs can be shown more effective than a central AHEC administration in promoting an improved supply and distribution of health professionals in rural and underserved areas.

Minnesota, Texas, and New Mexico are examples of states where decentralized training was effectively accomplished without regional AHECs; however, proposed regulations requiring regional AHECs in community hospitals threatened the extinction of statewide AHEC efforts (see Odegaard).

2. A stable federal source of funding should be established for off-campus support of health professional students who wish to take part

of their clinical training in a rural (or urban) underserved area.

Off-campus clinical training experiences, even those of short duration, can be very valuable to a student's (or resident physician's) decision to practice health care in rural and underserved areas. There are virtually no alternative sources of support for off-campus living expenses (which are often expenses added on to yearly on-campus leases, or room and board arrangements) associated with short-term preceptorships and rotations. During such short-term preceptorships, the trainee often requires considerable supervision--so it is unreasonable to require the host preceptor or health care facility to pay the student's living expenses.

3. A high funding priority should be given to rural, primary-care clinical experiences during the last two years of medical school (Phase D).

Given scarce funding resources, programs like AHEC, designed in part to improve the supply of primary care physicians in rural areas, might well emphasize Phase D preceptorships and other clinical experiences in rural and outstate areas. The present research suggests that clinical experiences during Phase D have the potential for being more influential in career choices concerning specialty and practice location than either earlier or later experiences. Phase D in medical education is apparently a key formative period for career decision-making.

4. Evaluation research concerning local, statewide, or national AHEC programs should be designed, in part, so as to provide information that will be relevant to improving the efficiency of such programs, and their effectiveness in meeting important AHEC objectives. Such evaluation designs should include explicit plans (a) for disseminating (publicly discussing or publishing) evaluation results; and (b) for using

these results to improve AHEC programs.

It seems unlikely that any evaluation of AHEC efforts could lead either to suggestions for program inprovement or to assessments of program effectiveness--unless such an evaluation gathered survey and follow-up data from former (or current) participants in these programs. Yet both recent national "evaluations" of the AHEC effort--one by Odegaard (1979) and the other by the U.S. Public Health Service (1979)--failed to include any recommendations or impact statements based on data systematically gathered from students and resident physicians participating in AHEC programs. Nor did these two evaluations make generalizations or suggestions concerning effective programs at the state or local level.

Also, future evaluation designs should include an appropriate control group, for comparison with the follow-up group of AHEC participants.

The August, 1980, national meeting of AHEC projects was useful in providing a forum for evaluators and staff of AHEC projects to share information concerning problems and progress in the operation (and evaluation) of effective AHEC programs.

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APPENDIX A

Cover Letter and Questionnaire Used in Survey

UNIVERSITY OF MINNESOTA
TWIN CITIES

Area Health Education Center
Suite 344, University Park Plaza
2829 University Avenue S.E.
Minneapolis, Minnesota 55414

(612) 376-3350

Dear Doctor

We hope you can take some time today (right now, if possible) to complete and return the enclosed questionnaire in the stamped, self-addressed envelope we have provided.

By completing this questionnaire, you will be helping evaluate a federally funded medical education program that helped provide part of your training as a ______________________________ at the University of Minnesota.

Our records indicate that during the period ______________________________, you participated in the following clinical training externship or rotation:

The UofM Area Health Education Center (AHEC), through a federal grant, helped pay for the costs associated with this rotation and hundreds of other similar rotations during the period 1972-1979. You and about 350 other former and current UofM medical students and resident physicians benefited from these rotations. AHEC paid living expenses for some of you; for others, AHEC helped provide faculty visits and supervision at your rotation site. All of you are receiving this questionnaire.

We at the UofM AHEC have been asked by federal AHEC officials to obtain your ratings of the quality and long-range impact of these rotations sponsored by the UofM Medical School and AHEC. We have also agreed to provide these federal officials with a group portrait of the current professional activities and future professional goals of former participants in AHEC-sponsored rotations.

Your responses to the enclosed questionnaire will help us provide these evaluation and follow-up data. We believe you understand the need for assessing the merit and impact of AHEC and other federally funded medical education programs. Although your participation in this survey is completely voluntary, we hope you will want to complete this questionnaire and share with us responsibility for evaluating this AHEC program. Such an evaluation will also help improve future AHEC programs.

Your survey responses will be treated as confidential. Please do not write your name on this questionnaire. The code number written in the upper left hand corner of the questionnaire enables identification of those persons completing questionnaires. Only research persons here at the UofM AHEC directly connected with this survey will see your questionnaire. No one from the Medical School or the rotation site will see your questionnaire or know whether you have completed it. No reports of this research will include questionnaire responses or other data enabling direct or indirect identification of individuals or places. The data obtained during this research will not be kept beyond the duration of the study and will be used only for the purposes stated in this letter.

We need your responses to this questionnaire--whether or not you are currently employed in patient care--and whether you live or work in a city, suburb, or rural area. We encourage you to be frank and objective in answering all items on the questionnaire.

We look forward to receiving your questionnaire soon. In return for your survey participation, we will send you a summary of the survey results.

I'd be happy to answer any questions you may have about this survey, your survey participation, or other aspects of our research. Please feel free to phone or write me directly.

Yours truly,

Paul S. Higgins

Paul S. Higgins, Ph.D.
Associate Director for Evaluation

PSH/mlb
Enclosure F

UNIVERSITY OF MINNESOTA
TWIN CITIES

Area Health Education Center
Suite 300 University Park Plaza
2829 University Avenue Southeast
Minneapolis, Minnesota 55414

(612) 376 3350

FOLLOW-UP QUESTIONNAIRE FOR FORMER PARTICIPANTS IN MEDICAL SCHOOL EXTERNSHIPS OR RESIDENCY ROTATIONS SPONSORED IN PART BY THE UofM AHEC

__________________5 Code Number *(7-10)*

YOUR CURRENT PROFESSIONAL ACTIVITIES

1. What is your current training status as a physician? (check one answer below)

1 ☐ I'm in medical school
2 ☐ I'm in residency training
3 ☐ I've completed residency training
4 ☐ Other. Please explain: ______________
____

2. What specialty are you currently practicing, or preparing to practice? (If you are in residency training, what is the specialty content of your current residency program? If you are in medical school, what is your current medical school specialty track?) (check one)

1 ☐ Family or general practice
2 ☐ General internal medicine
3 ☐ Pediatrics
4 ☐ Obstetrics and gynecology
5 ☐ Other. Please specify: ______________
____
6 ☐ I haven't yet officially chosen a specialty

3. Are you board-certified in any specialties?

1 ☐ Yes
2 ☐ No

● If you answered "yes," please use the blank(s) below to specify your board-certified specialties:

____
____

4. Your main professional location is the place where you spend the most time in your practice--or, if you are still in training, it is the main site of your residency or medical education.

We understand that your current main professional location is--

____
(clinic, hospital, university)

____
(city or town)

____
(state)

Please cross out any incorrect information above and write the correct information nearby.

5. What percentage of your time during the past 12 months did you spend in care or services to patients? (fill in the blank below)

About ______ percent of my time. *(14-15)*

6. Please list your 3 most important professional activities during the past 12 months (for example, patient care, studying, research, teaching, etc.):

a. ________________________________
b. ________________________________
c. ________________________________

YOUR MEDICAL SERVICE OBLIGATIONS

Did you, or do you, have an obligation to serve as a physician--

7. In a branch of the Armed Forces?

1 ☐ Yes *(20)*
2 ☐ No

● If you answered "yes," please specify the actual or expected years of this required military medical service: (fill in the blanks below)

From 19___ to 19___ *(21-24)*

8. In the National Health Service Corps?

1 ☐ Yes
2 ☐ Yes, but I have decided to repay this obligation without serving
3 ☐ No

● If you answered "yes," please specify the actual or expected years and location of this NHSC service: (fill in the blanks below)

From 19___ to 19___ *(26-29)*

Specify location, if possible:

______________________ ______________________
(city or town) (state or country)

SOME BACKGROUND INFORMATION

9. Before you entered medical school, what town or city did you live in for the greatest number of years? (please specify)

______________________ ______________________
(city or town) (state)

10. Please specify your age:

____ years old *(31-32)*

11. Please indicate your marital status: (check one)

1 ☐ Single or presently unmarried *(33)*
2 ☐ Married

12. Did (does) your medical school's curriculum provide for tracking; that is, were (are) students asked to emphasize a particular specialty area?

1 ☐ Yes *(34)*
2 ☐ No

● If you answered "yes," please use the blank below to specify your own track or specialty emphasis during medical school: (If you are currently a medical student and you answered Question 2, you do not need to repeat your answer here)

____

GO ON TO THE NEXT PAGE--

A CLINICAL TRAINING ROTATION YOU TOOK, SPONSORED IN PART BY THE UofM AHEC

FIRST, we wish to verify our understanding, expressed in the cover letter, that you participated in an AHEC sponsored clinical training rotation. Please answer the following question:

1. While you were a ____________________ at the University of Minnesota..did you participate in a ____________________________ rotation at _____________________________________ with _____________________________________ during the approximate period ______/______ to ______/______? (check one)

1 ☐ Yes (35)
2 ☐ No
3 ☐ I'm not sure

- If you answered "no" or "I'm not sure," you may be unable to complete this page of the questionnaire. We would still appreciate your completing the rest of the questionnaire and returning it to us.

SECOND, if you remember the rotation referred to above, please rate this rotation by answering the following questions:

2. How would you rate this rotation in terms of giving you direct experience with the range of clinical problems in the specialty area of the rotation? (check one)

1 ☐ Excellent
2 ☐ Good (36)
3 ☐ Fair
4 ☐ Poor

3. How would you rate this rotation in terms of helping you develop professional skills in the specialty area of the rotation? (check one)

1 ☐ Excellent
2 ☐ Good (37)
3 ☐ Fair
4 ☐ Poor

4. How important was this rotation in helping you decide upon a specialty (or subspecialty)? (check one)

1 ☐ Very important
2 ☐ Somewhat important
3 ☐ Slightly important (44)
4 ☐ Not at all important
5 ☐ Don't know how important
6 ☐ This question doesn't apply to me, because I'd already decided upon a specialty

5. How important was this rotation in helping you decide what would be an ideal type of practice location for you? (check one)

1 ☐ Very important
2 ☐ Somewhat important (45)
3 ☐ Slightly important
4 ☐ Not at all important
5 ☐ Don't know how important

THIRD, use the space below for any comments you may wish to make concerning the quality of this rotation, or its influence on your choice of specialty or practice location:

GO ON TO THE NEXT PAGE--

WHAT WOULD BE AN IDEAL PRACTICE SITUATION FOR YOU IN 5-10 YEARS?

- Please answer the questions on this page and the next one so as to describe an ideal practice situation for you in 5-10 years, after you have finished your professional training and any required medical service obligations (for example, required military medical service, National Health Service Corps work, or medical service to obtain loan forgiveness).
- By "ideal practice situation," we mean a combination of professional activities, practice arrangement or work conditions, and practice location that would be ideal for you.

1. Specify or describe the specialty, subspecialty, or major professional activity you hope to practice, or be involved in, in 5-10 years--after you have finished your training and any medical service obligations (this specialty or activity may or may not be the same one you specified on Page 1 of this questionnaire):

____

____

____

____

____

____

____

2. In an ideal practice situation for you, what percentage of your time would you spend in each of the following activities? (your percents should total 100)

____% in care or services to patients

____% in teaching *(47-56)*

____% in research

____% in administration of a clinic, hospital, or other health care facility

____% in other activities. Please specify: ______

____

100% total

3. Indicate the type of practice arrangement you would most prefer: (check one)

1 ☐ Solo practice
2 ☐ Partnership
3 ☐ Single specialty group
4 ☐ Multi-specialty group
5 ☐ Other. Please specify: ____________________
6 ☐ Don't know

4. Indicate the size of the community in which you hope to practice in 5-10 years: (check one)

1 ☐ Under 2,500 people
2 ☐ At least 2,500 but less than 10,000
3 ☐ At least 10,000 but less than 25,000
4 ☐ At least 25,000 but less than 50,000
5 ☐ At least 50,000 but less than 100,000
6 ☐ At least 100,000 but less than 200,000
7 ☐ At least 200,000 but less than 500,000
8 ☐ 500,000 or more people
9 ☐ Don't know

5. Indicate the type of community in which you hope to practice in 5-10 years: (check one)

1 ☐ the main city portion of a metropolitan area. (A "metropolitan area" includes counties containing a city--or twin cities--having 50,000 or more people)
2 ☐ An "inner" suburb, just outside the main city portion of a metropolitan area
3 ☐ An "outer" suburb, which may be a town, small city, or even a rural area at the outskirts of a metropolitan area
4 ☐ A non-metropolitan area community within 50 miles of a metropolitan area
5 ☐ A non-metropolitan area community that is 50 or more miles from a metropolitan area
6 ☐ Other. Please specify: ____________________
7 ☐ Don't know

6. Indicate the geographic area in which you hope to practice in 5-10 years: (check one)

1 ☐ Minnesota
2 ☐ Another U.S. state. Please specify: ____________
____
3 ☐ An area outside the U.S. Please specify: ________
____
4 ☐ Don't know

GO ON TO THE NEXT PAGE--

7. Listed below are some features that might, or might not, be part of an ideal practice situation for you in 5-10 years, after you have finished your training and your medical service obligations. Rate the importance of each feature to your choice of an ideal practice situation in 5-10 years, if you have complete freedom to choose.

How important would this feature be to your choice of an ideal practice location in 5-10 years? (check one box for each feature to indicate your rating)

Feature	Very important	Somewhat important	Slightly important	Not at all important	Don't Know how Important
a. Opportunity to care for the same patients over an extended period of time	☐	☐	☐	☐	☐
b. Opportunity to provide and supervise a comprehensive range of health care services for the same patients	☐	☐	☐	☐	☐
c. Opportunity to enjoy the particular urban, or suburban, or rural life style I prefer	☐	☐	☐	☐	☐
d. Opportunity to work with a medically underserved group of patients who have lacked access to adequate health care	☐	☐	☐	☐	☐
e. Opportunity to practice the full range of skills and knowledge in my specialty	☐	☐	☐	☐	☐
f. Opportunities for my spouse to pursue employment, education, or other interests	☐	☐	☐	☐	☐
g. Opportunity to earn an income at least equal to the average for other physicians with experience and training similar to mine	☐	☐	☐	☐	☐
h. Opportunity to live near relatives or long-time friends	☐	☐	☐	☐	☐
i. Opportunity to purchase or join an already established and desirable practice	☐	☐	☐	☐	☐
j. Availability of loans or other financial assistance needed to start or purchase a practice	☐	☐	☐	☐	☐
k. Opportunity to work, during at least part of my practice time, in a prepaid, health maintenance organization	☐	☐	☐	☐	☐
l. Opportunity to share call with other physicians-- so I can have adequate time for meetings, recreation, and vacations	☐	☐	☐	☐	☐
m. Availability of good hospitals and other clinical support facilities and services	☐	☐	☐	☐	☐
n. Opportunity to consult with other physicians	☐	☐	☐	☐	☐
o. Opportunities for continuing medical education	☐	☐	☐	☐	☐
p. Other feature(s) Please specify these other features: ____________________ ____________________	☐	☐	☐	☐	☐
	1	2	3	4	5

(61)

●If you have completed your residency and are now in practice, please complete the two items below. Skip these two items if you are still in your residency or in medical school.

8. Please rate the overall similarity of your current practice situation to the ideal practice situation you have described above and on the previous page: (check one)

1 ☐ Very similar

2 ☐ Somewhat similar (77)

3 ☐ Somewhat dissimilar

4 ☐ Very dissimilar

9. If possible, describe one or two improvements in your present practice situation that would be most necessary to make your present situation ideal for you:

____

____

____

____

____

____

THE END. THANK YOU.